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ELECTRICAL TIMES

MEMERA

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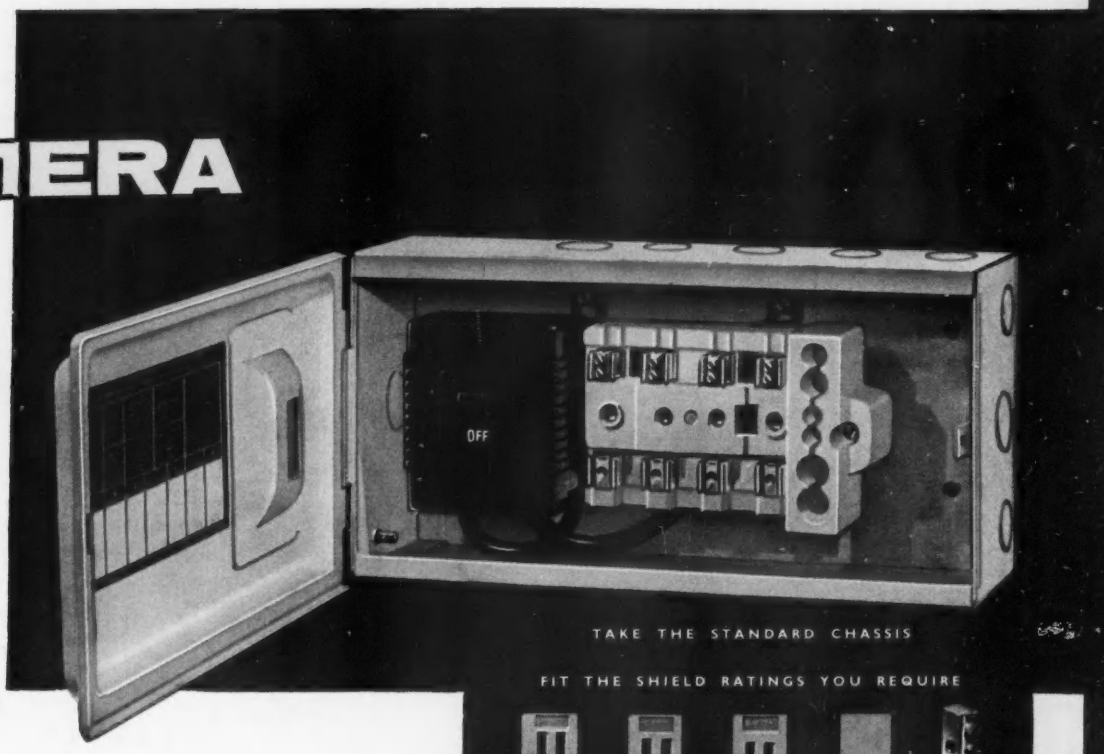
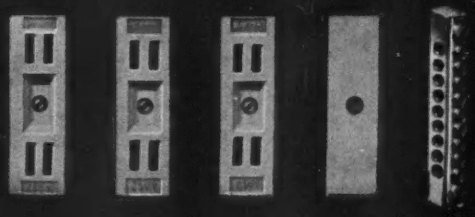


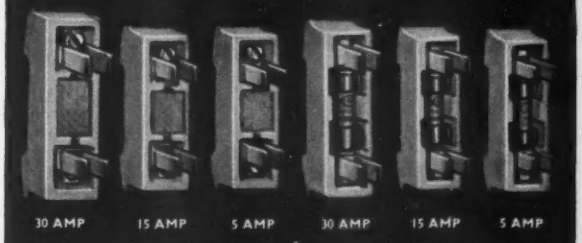
TAKE THE STANDARD CHASSIS

FIT THE SHIELD RATINGS YOU REQUIRE



ONLY THE RIGHT FUSE HANDLE RATINGS WILL THEN FIT

REWIRABLE OR H.R.C.



If the job calls for unusual fuse combinations, it's no trouble at all with Memera. No other equipment gives you the same versatility as Memera. The system is so delightfully simple. The chassis is the same for all combinations. Just fit the appropriate shields to suit the fuse ratings you need for the job. Once these are fitted, only the correctly rated fuse handles can be inserted. And of course with Memera there is the big advantage that you can use either rewirable or H.R.C. fuses.

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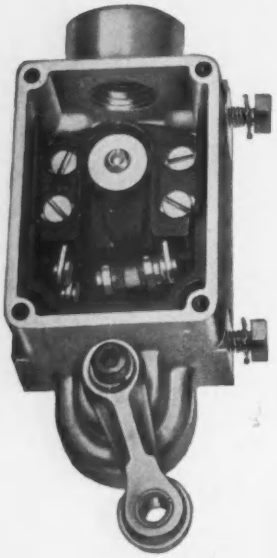


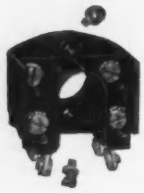
Two only replaceable assemblies in the electrical side: moulded one-piece contact block and arm. Interchangeable on all Mark II versions.

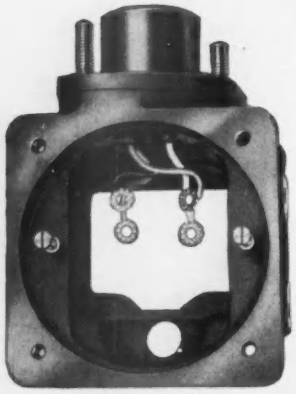
Water Oil and Dustproof or Flameproof versions

STANDARD

WATER, OIL & DUSTPROOF

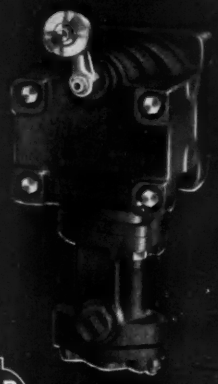
Single pole, double break, double throw, operates with either circuit normally open with other closed, or maintaining in either position, or available with central (neutral) position and/or centre connection. Heavy aluminium die-cast case. Conduit ¾" B.S., or No. 3 Admiralty Pattern Cable gland entry. Two-screw side mounting or backplate mounting in two styles, or Tandem style (back to back mounting). Operating lever position adjustable in 7.5 deg. increments through 82.5 deg. either way from normal.





The mechanism of the Flameproof switch is easily removable as a unit for servicing.

Standard Neutral position or Centre connection



FLP FLAMEPROOF

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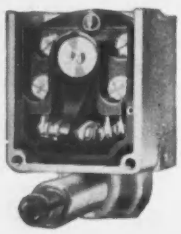
Buxton certificates No. 3574 (Group I) No. 3575 (Groups II and III gases). Meehanite iron castings. Self wiping solid silver contacts, interchangeable plugs and sockets. ***Single SWA cable entry (standard); double entry if required.*** *Operating lever position adjustable in 7.5 deg. increments through 360 degs. Single pole, double break, having one normally closed and one normally open circuit. Available with central (neutral) position and/or centre connection.*

MARK II

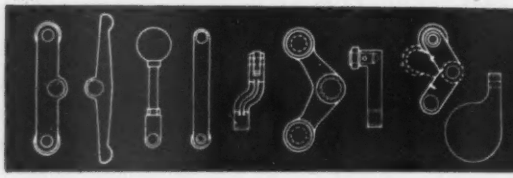


B.S.A. SNAP-LOCK ACME

Catalogue of switches and levers on request

HEAVY DUTY LIMIT SWITCHES

471



A few examples from the range of more than 40 styles (over 150 sizes) of interchangeable operating levers. List on request.

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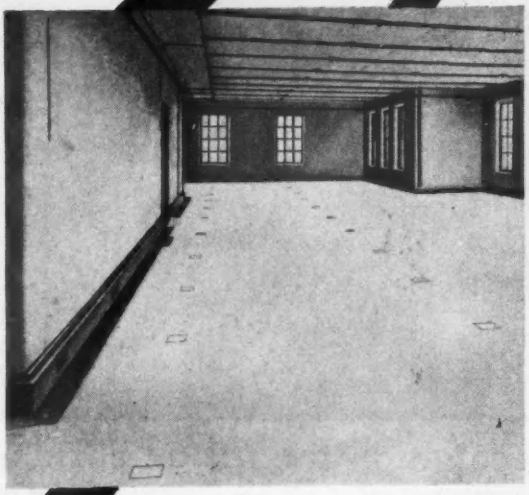
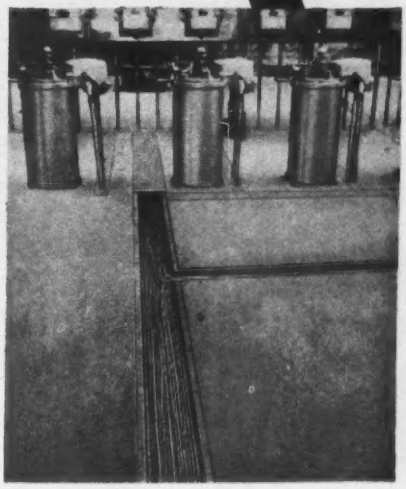


Power Centre trunking, whether it be for skirting, floor, underfloor, or surface is cleverly designed to conform with any trunking layout. Thus, you have the advantage of a tailor-made system at a factory-made price; far less time and trouble, too, because Power Centre trunking is jig made and zinc coated. A letter or postcard will bring you fully descriptive literature.



Power Centre products include:

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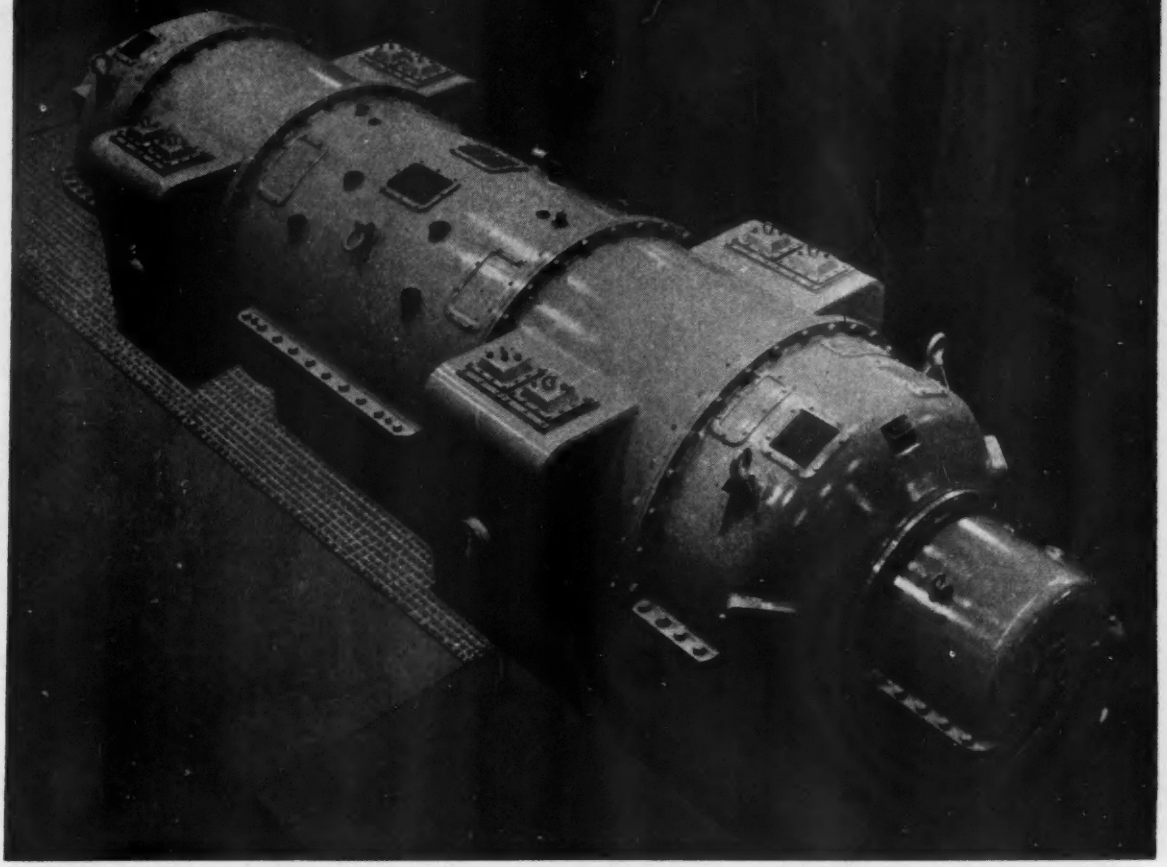

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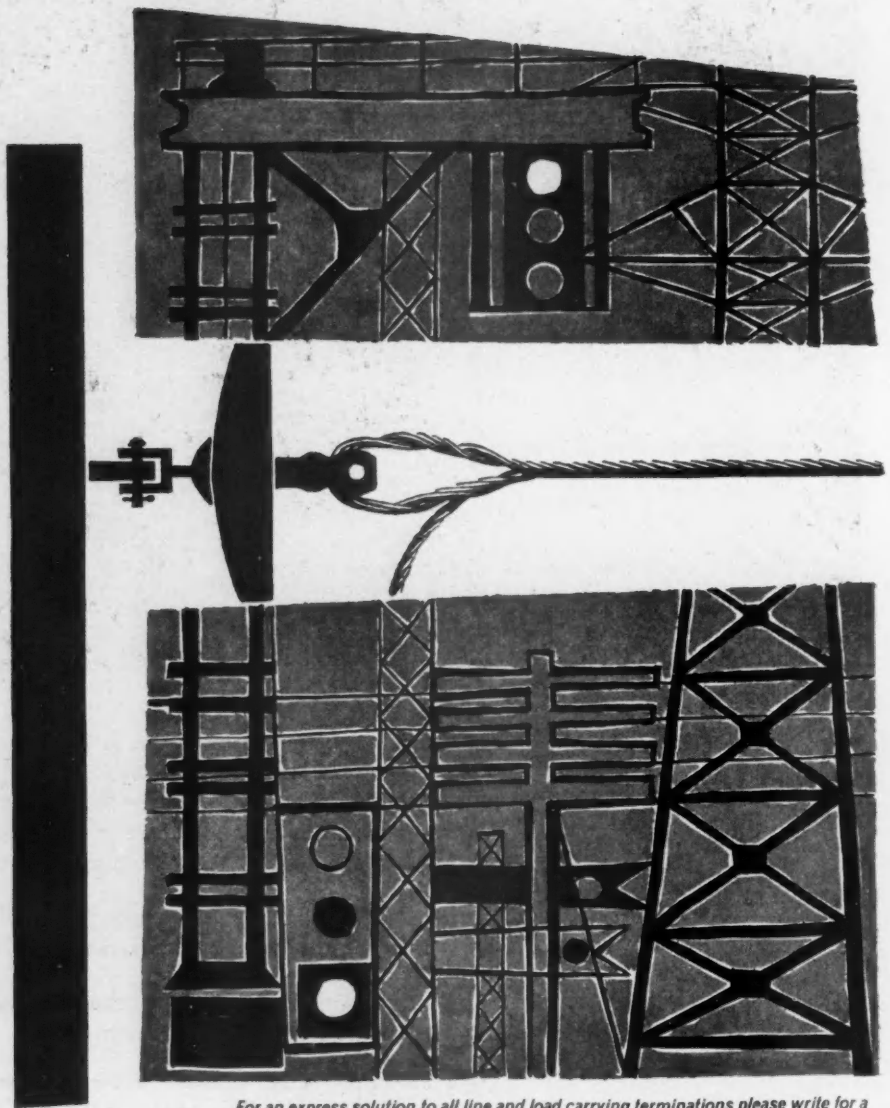

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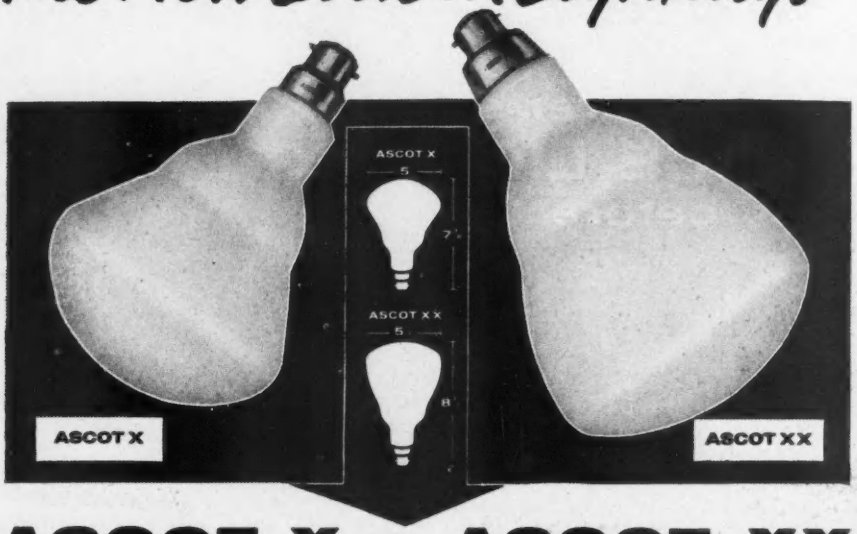

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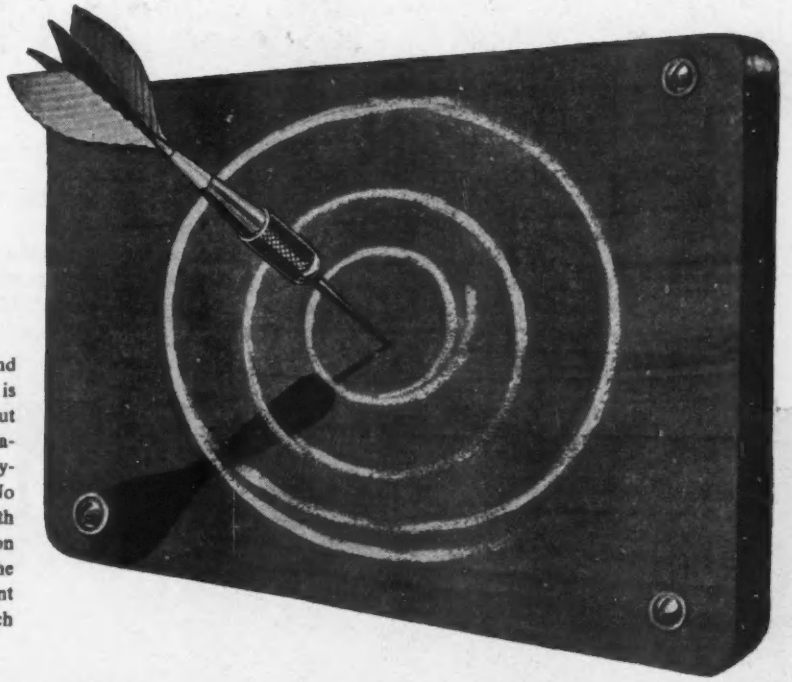

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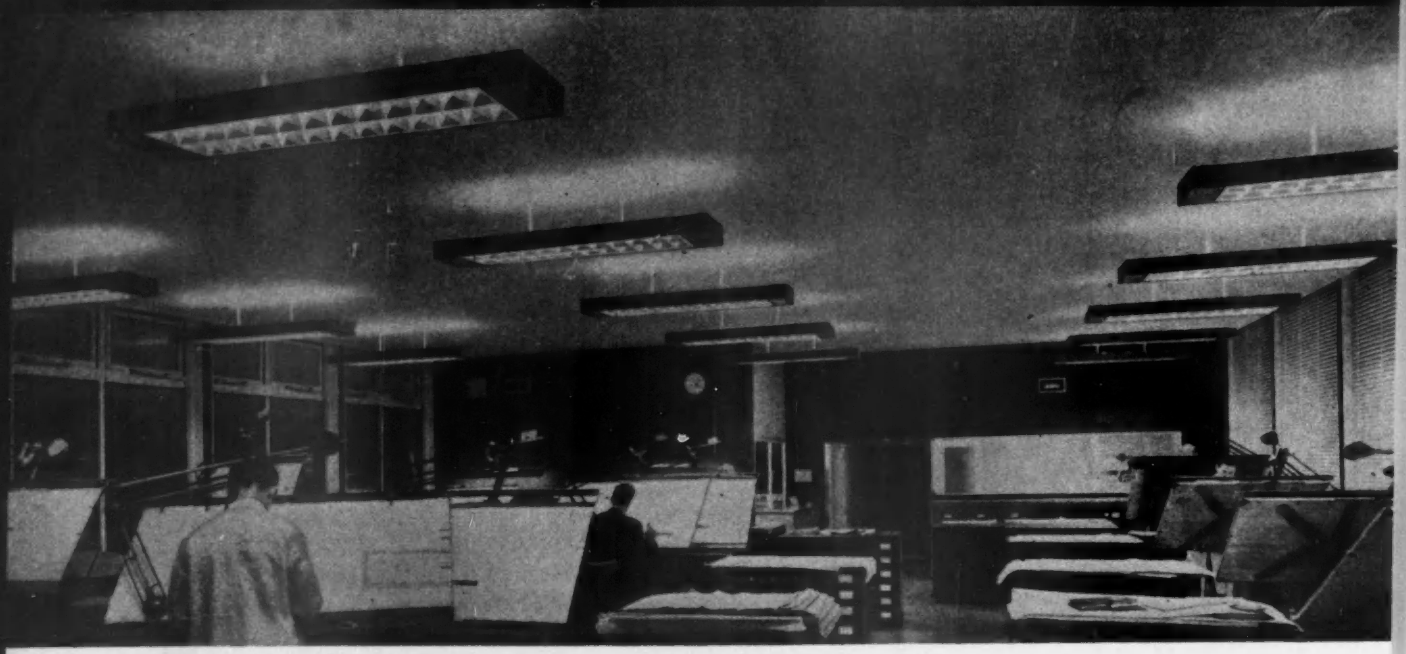

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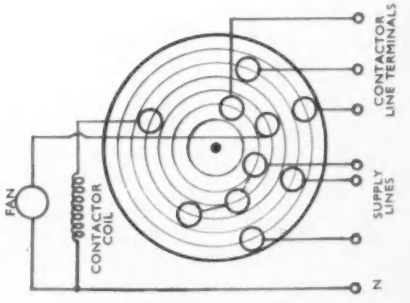

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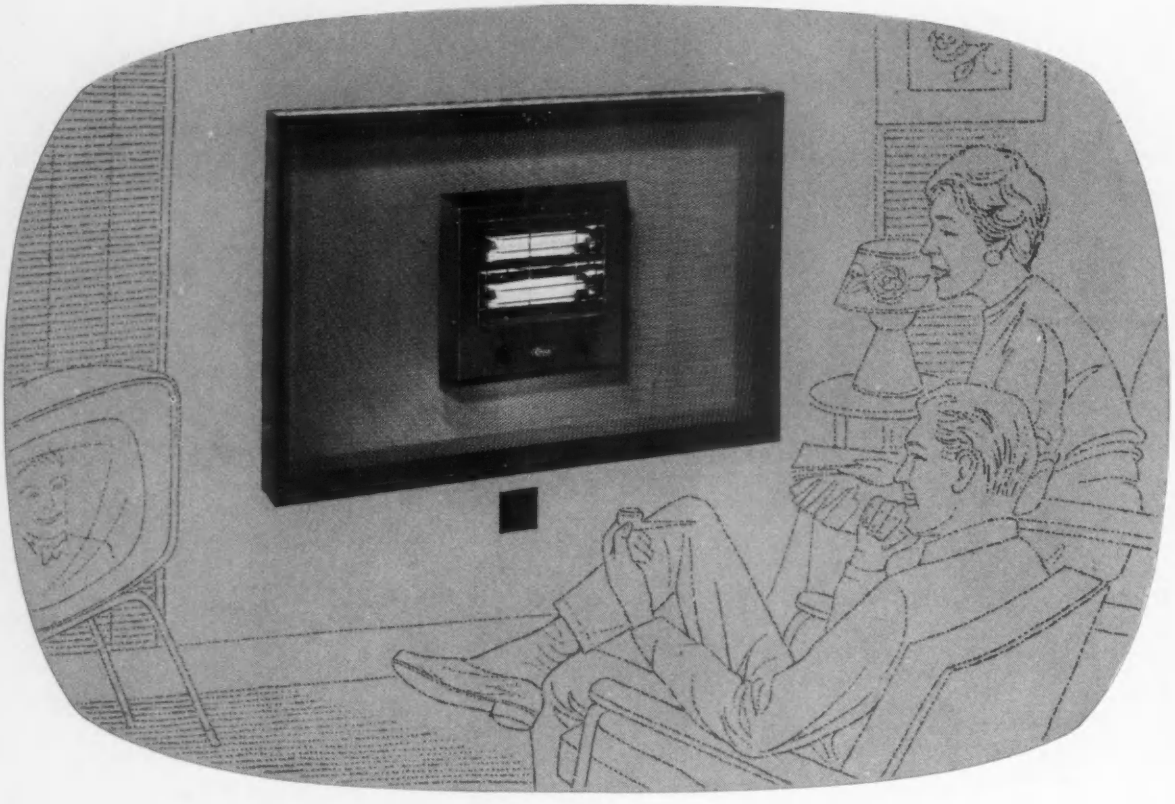

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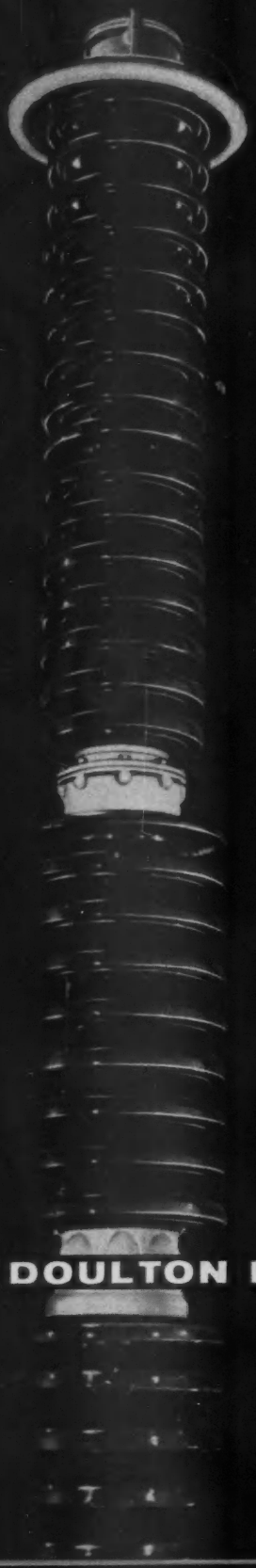

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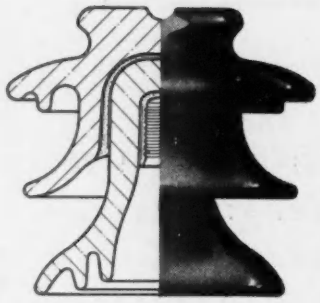
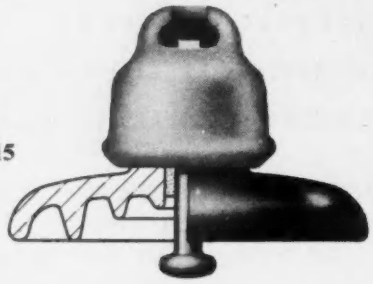
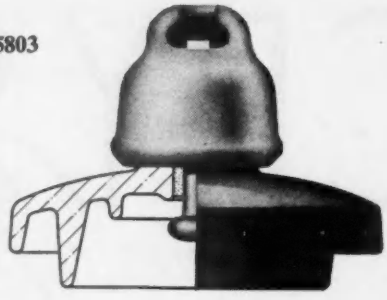


33 kV Pin Insulator, Type BC. 28
Complying with B.S. 137/1960
Minimum Failing Load 2400 lb.



Disc Insulator, Type P.42B/8/5515
Complying with B.S. 137/1960
Minimum Failing Load 42000 lb.



Disc Insulator, Type F.42B/6¾/5803
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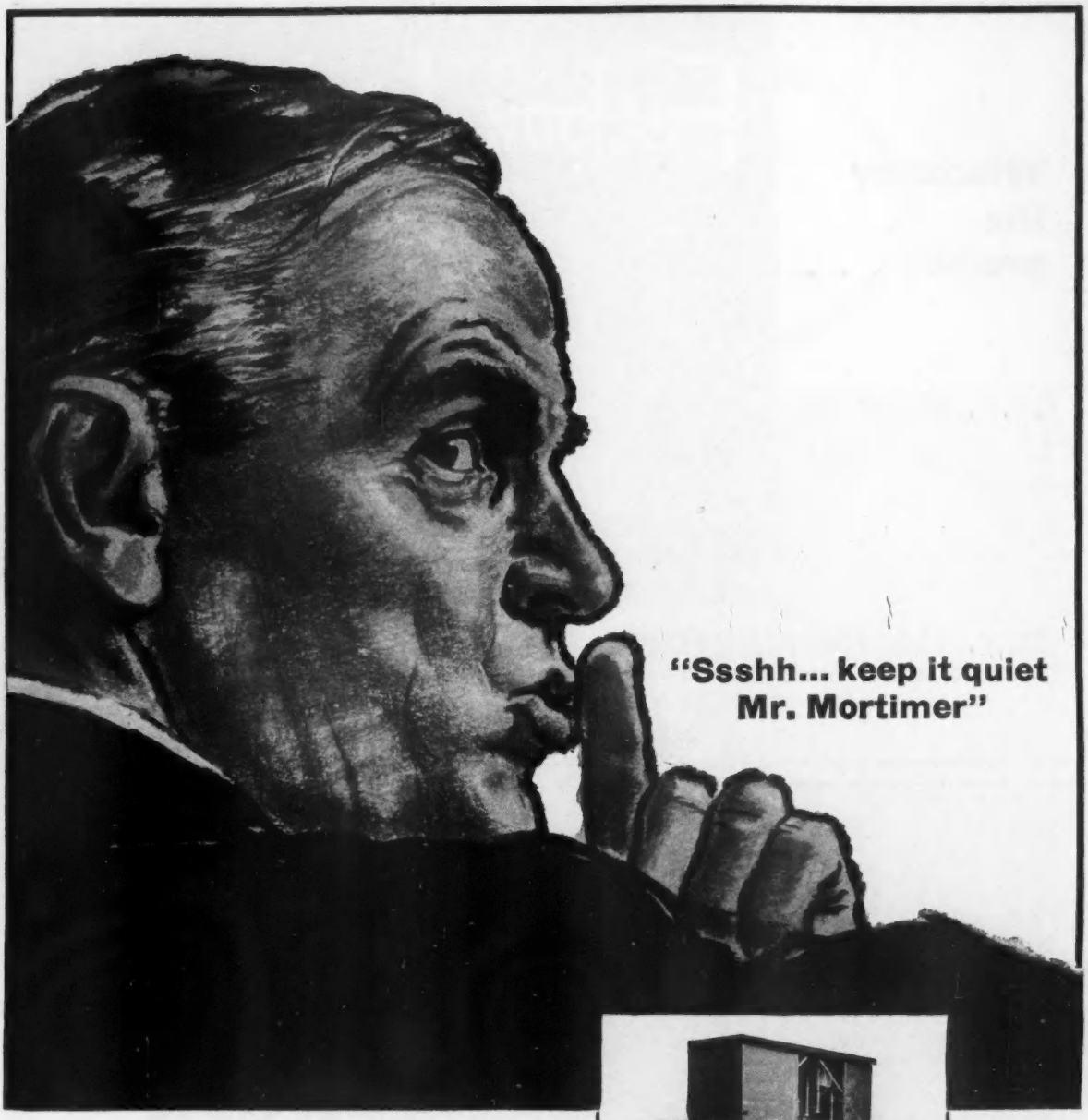

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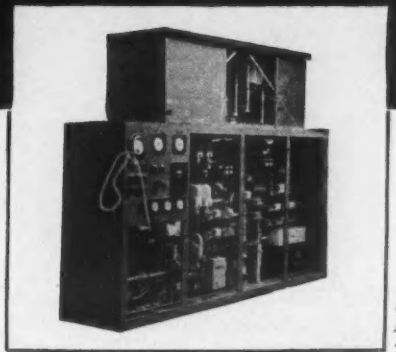

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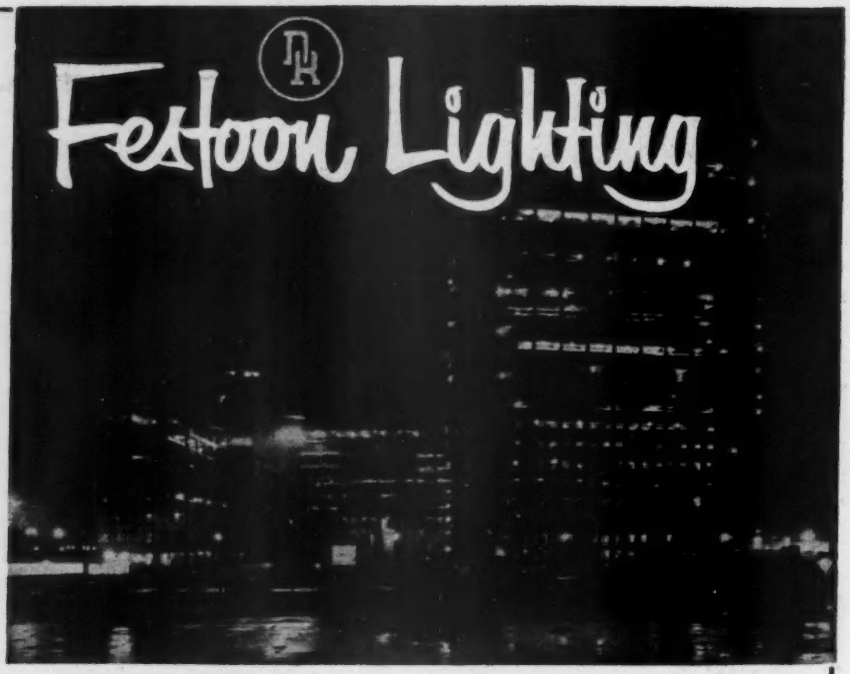

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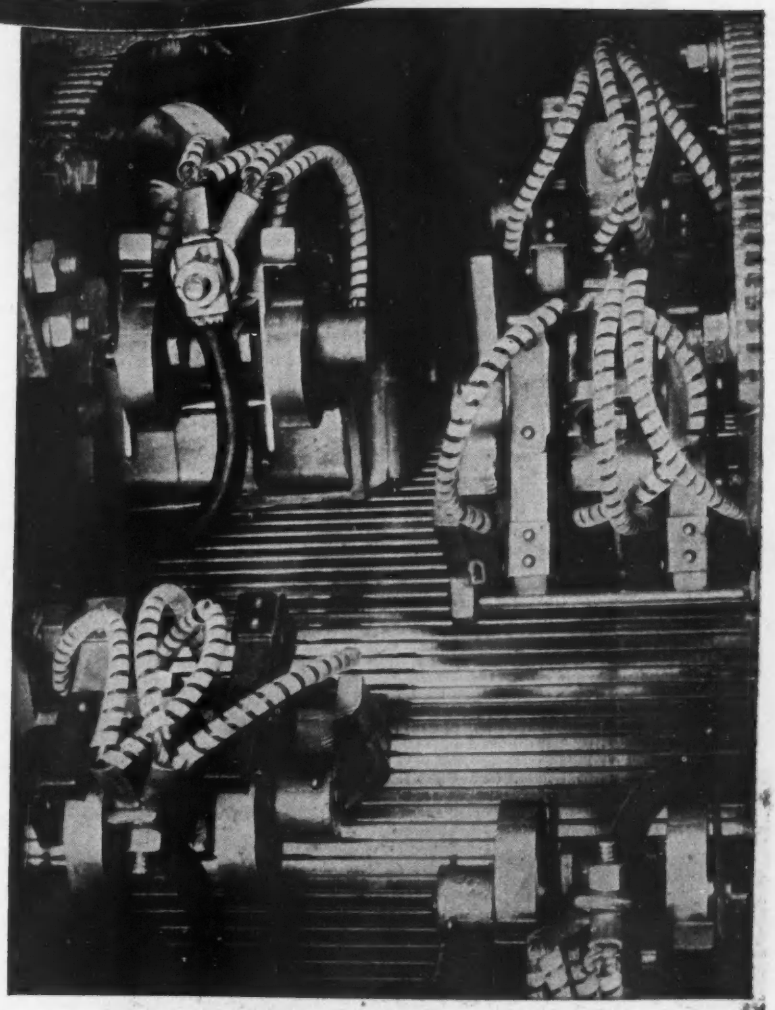

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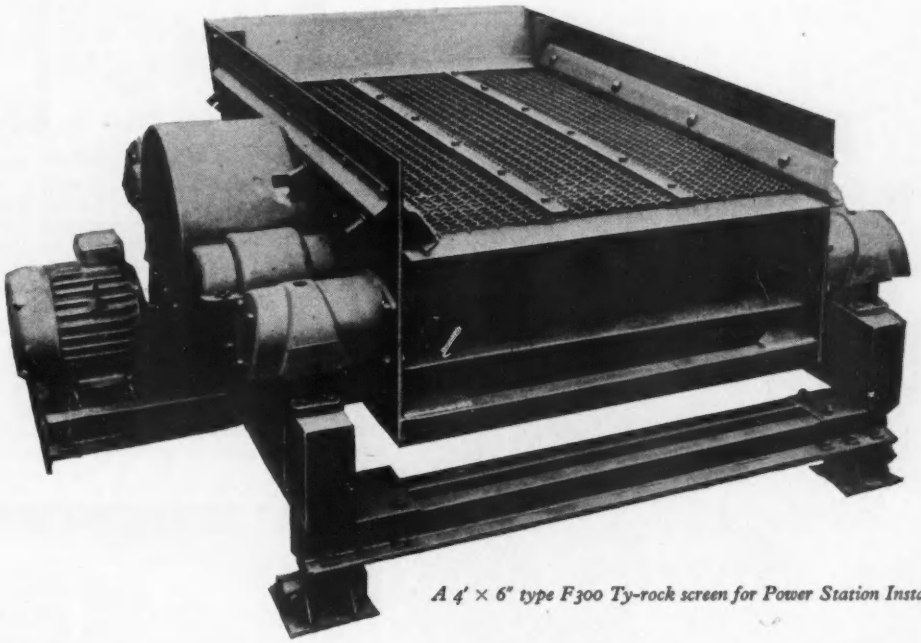

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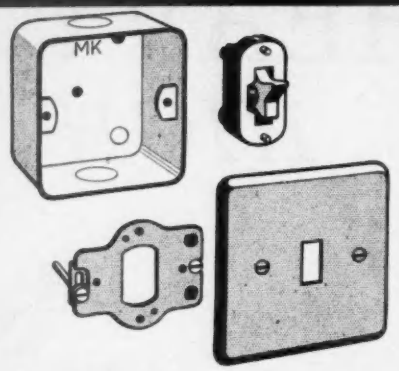

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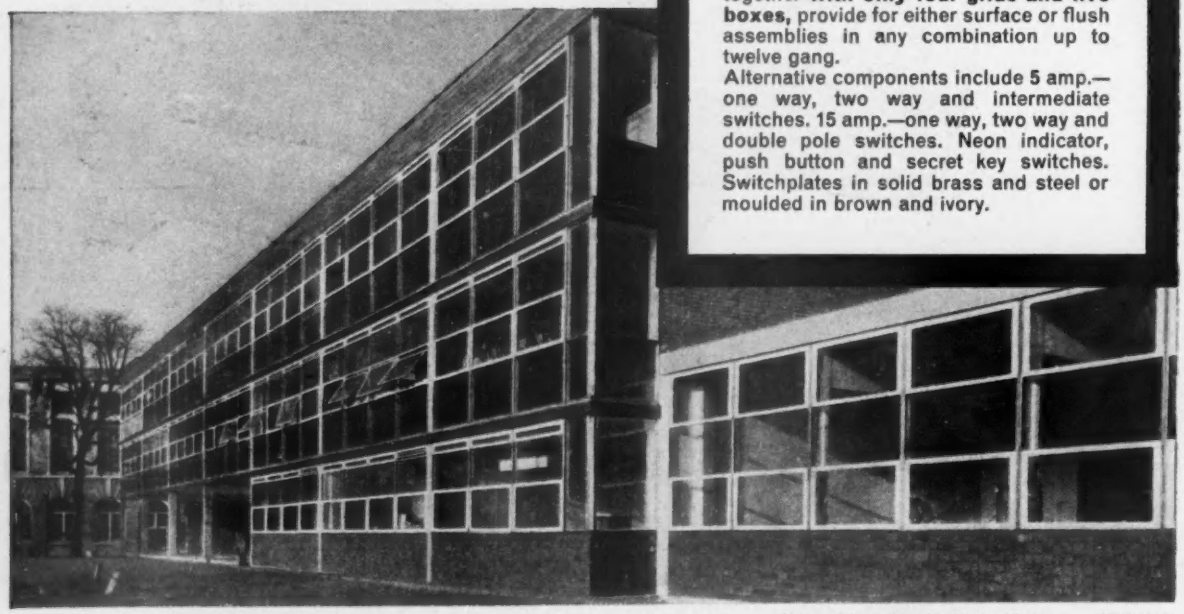
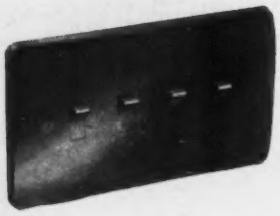
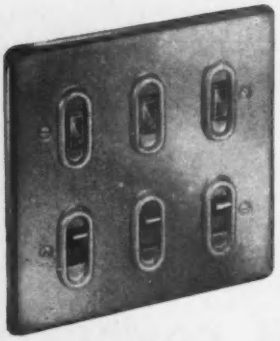
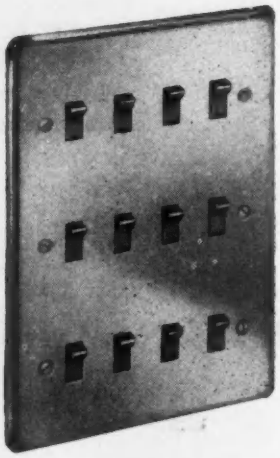


Photograph by courtesy of Architectural Review MK 210 DHB

Just a few of the infinite variety of MK Gridswitch Assemblies







MK GRIDSWITCH

M. K. ELECTRIC LIMITED, EDMONTON, LONDON N.9. TELEPHONE: EDMONTON 5151

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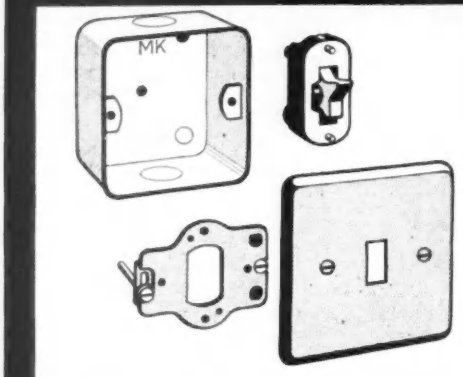

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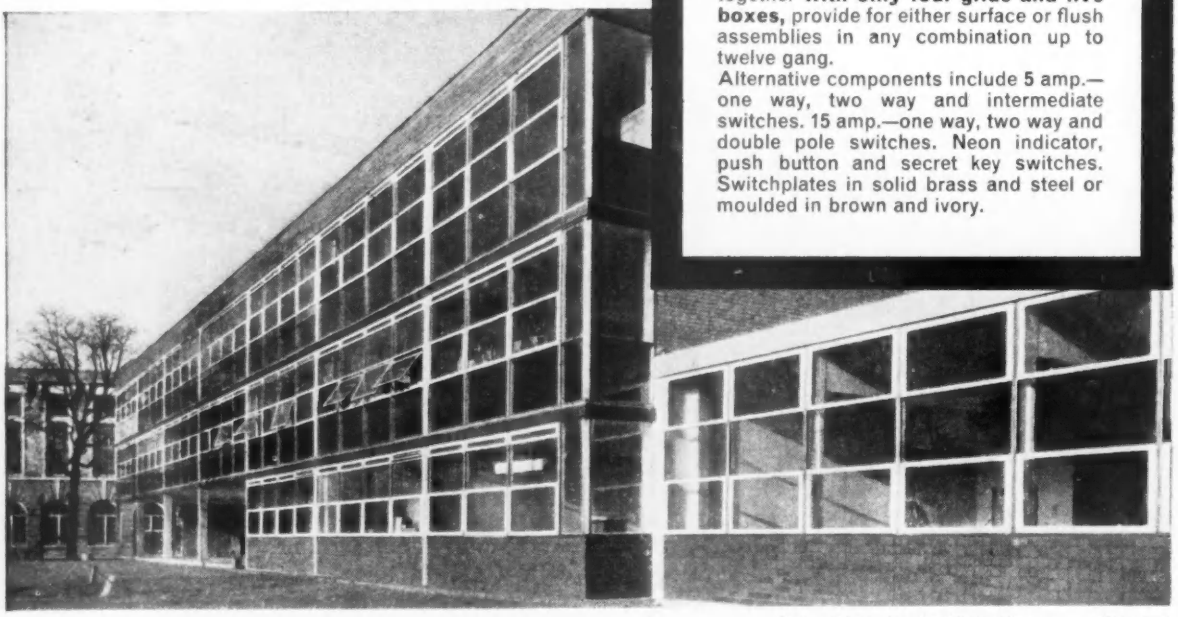

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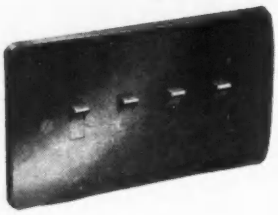

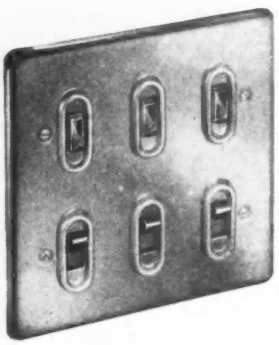

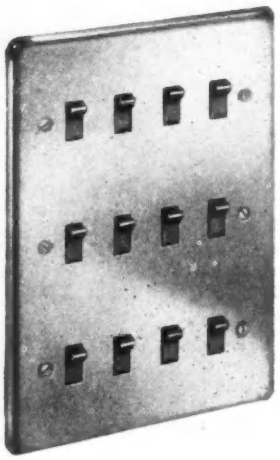

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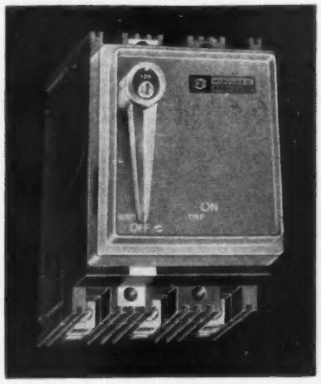

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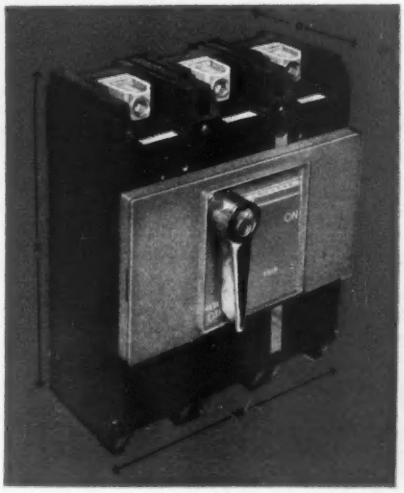

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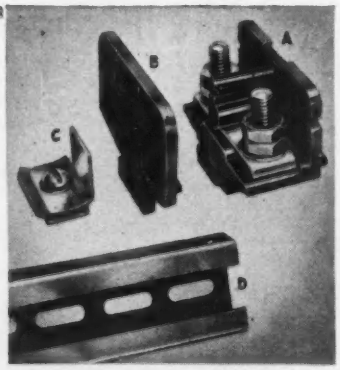

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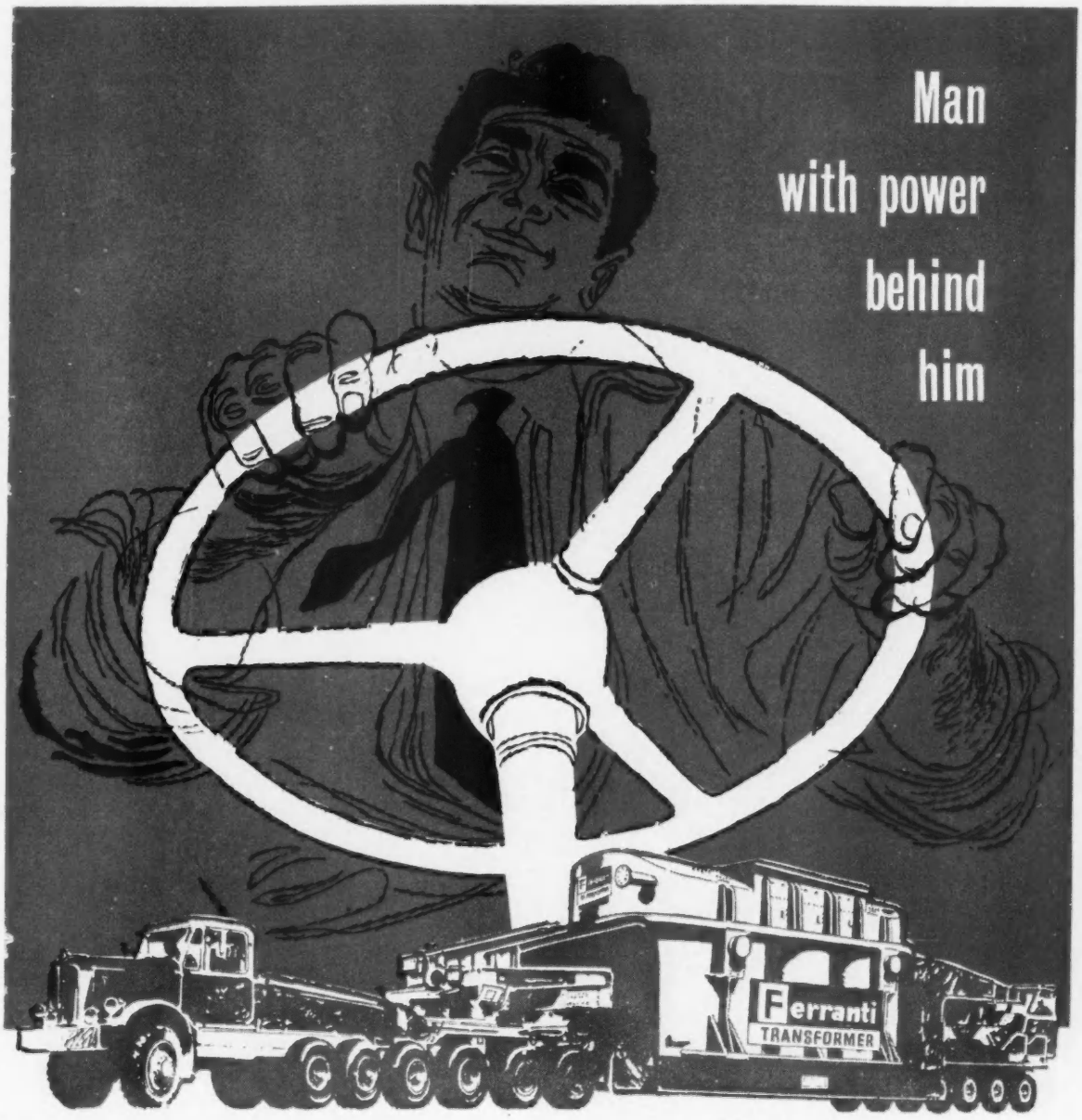

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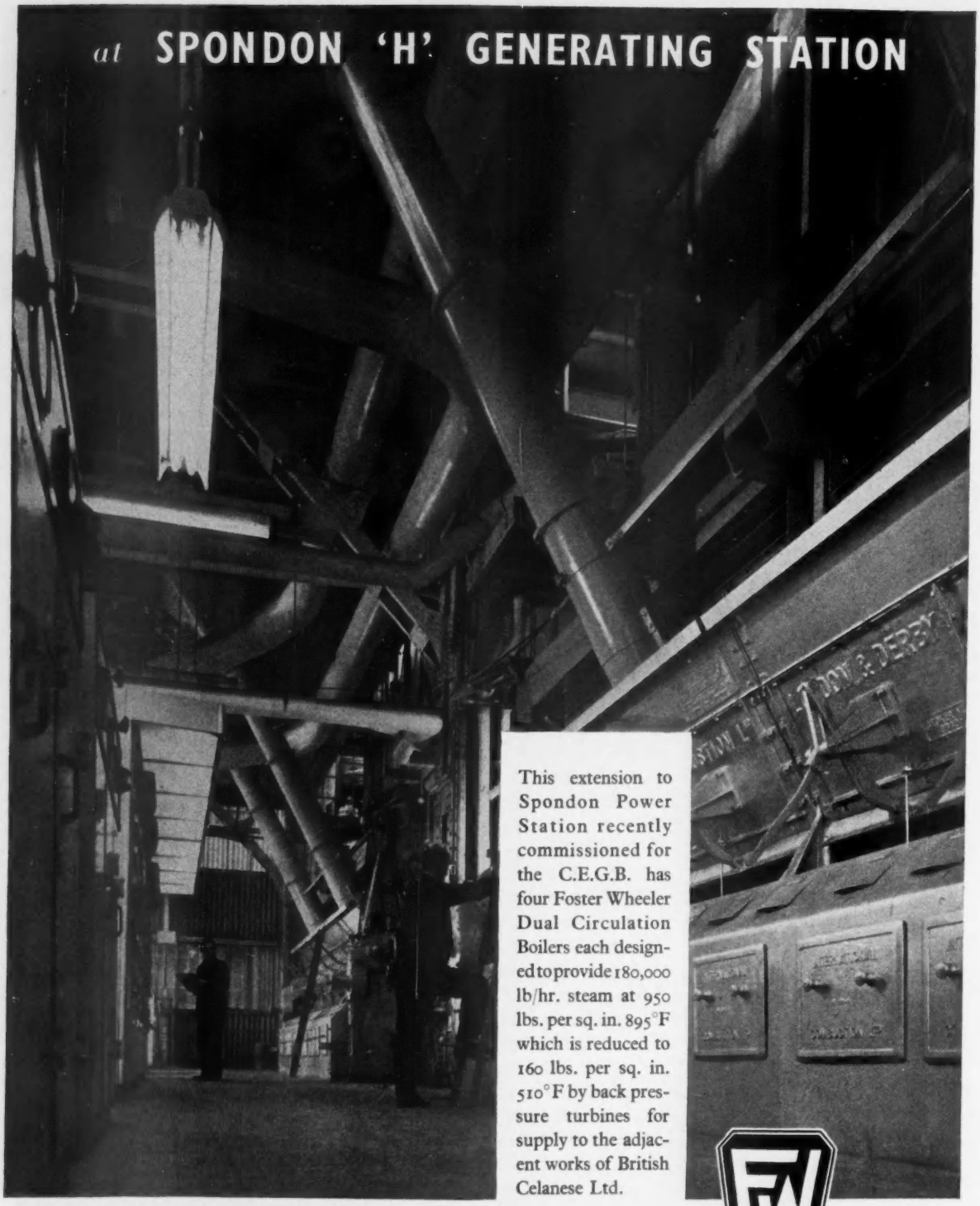
FOSTER WHEELER DUAL CIRCULATION BOILERS

at SPONDON 'H' GENERATING STATION

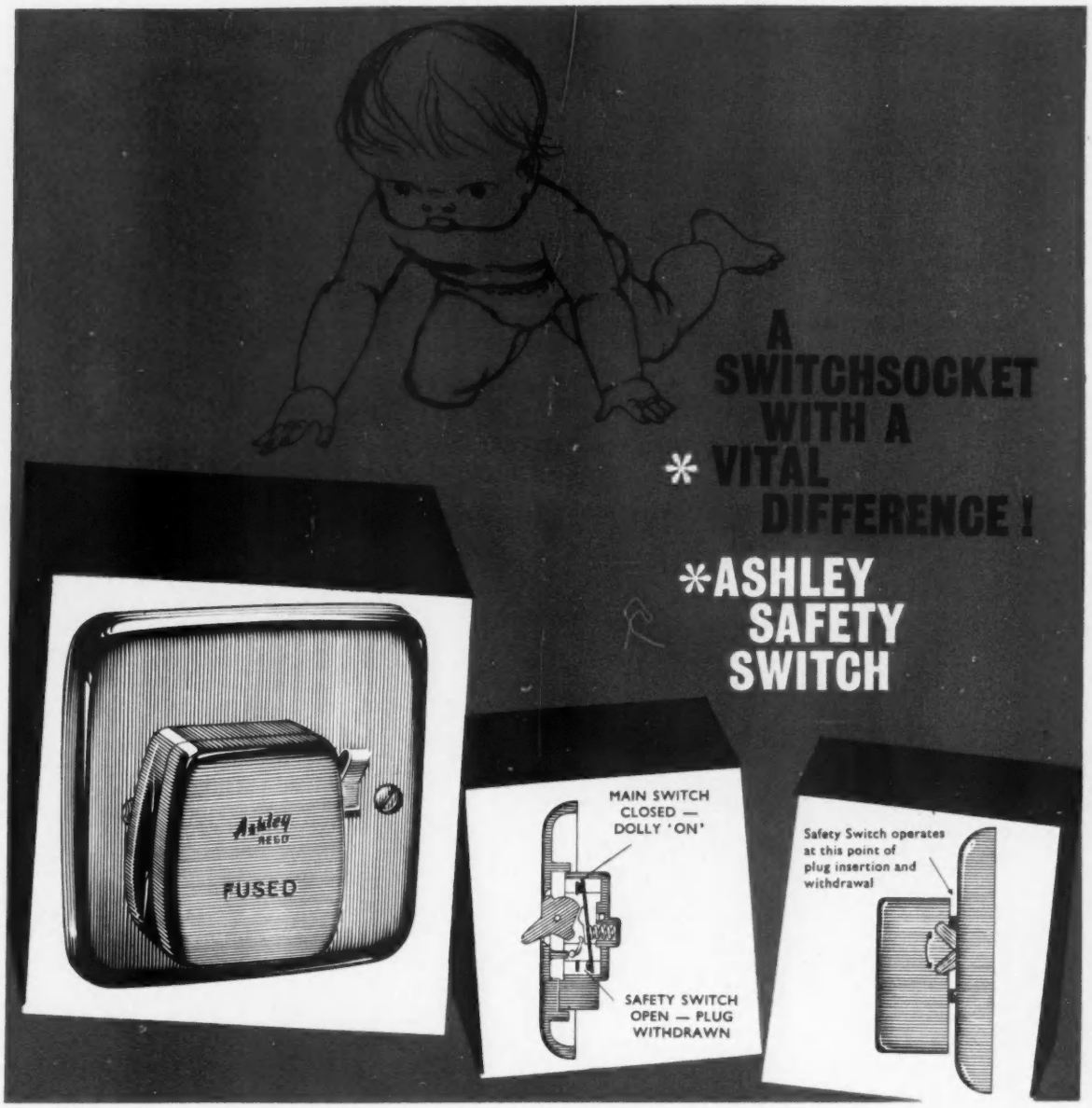


This extension to Spondon Power Station recently commissioned for the C.E.G.B. has four Foster Wheeler Dual Circulation Boilers each designed to provide 180,000 lb/hr. steam at 950 lbs. per sq. in. 895°F which is reduced to 160 lbs. per sq. in. 510°F by back pressure turbines for supply to the adjacent works of British Celanese Ltd.

Photograph by courtesy of the Central Electricity Generating Board

FOSTER WHEELER LIMITED

FOSTER WHEELER HOUSE, CHAPEL STREET, LONDON, N.W.I. *Telephone: PADdington 1221*


A SWITCHSOCKET WITH A * VITAL DIFFERENCE !
*ASHLEY SAFETY SWITCH
Ashley REGD.
FUSED
MAIN SWITCH CLOSED — DOLLY 'ON'
SAFETY SWITCH OPEN — PLUG WITHDRAWN
Safety Switch operates at this point of plug insertion and withdrawal

13 AMP SWITCHSOCKETS		
CAT No	DOZ LIST	TYPE
SS 31	69/-	Surface Br
SS 32	76/-	Surface Cr
SS 35	67/-	Flush Br
SS 36	74/-	Flush Cr
HEAVY DUTY		
SS 41	92/8	Surface Blk
SS 45	81/4	Flush Blk

13 AMP FUSED PLUGS		
PG 13	34/-	Brown
PG 14	38/-	Cream
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ASHLEY 13 AMP SWITCHSOCKET WITH SAFETY SWITCH

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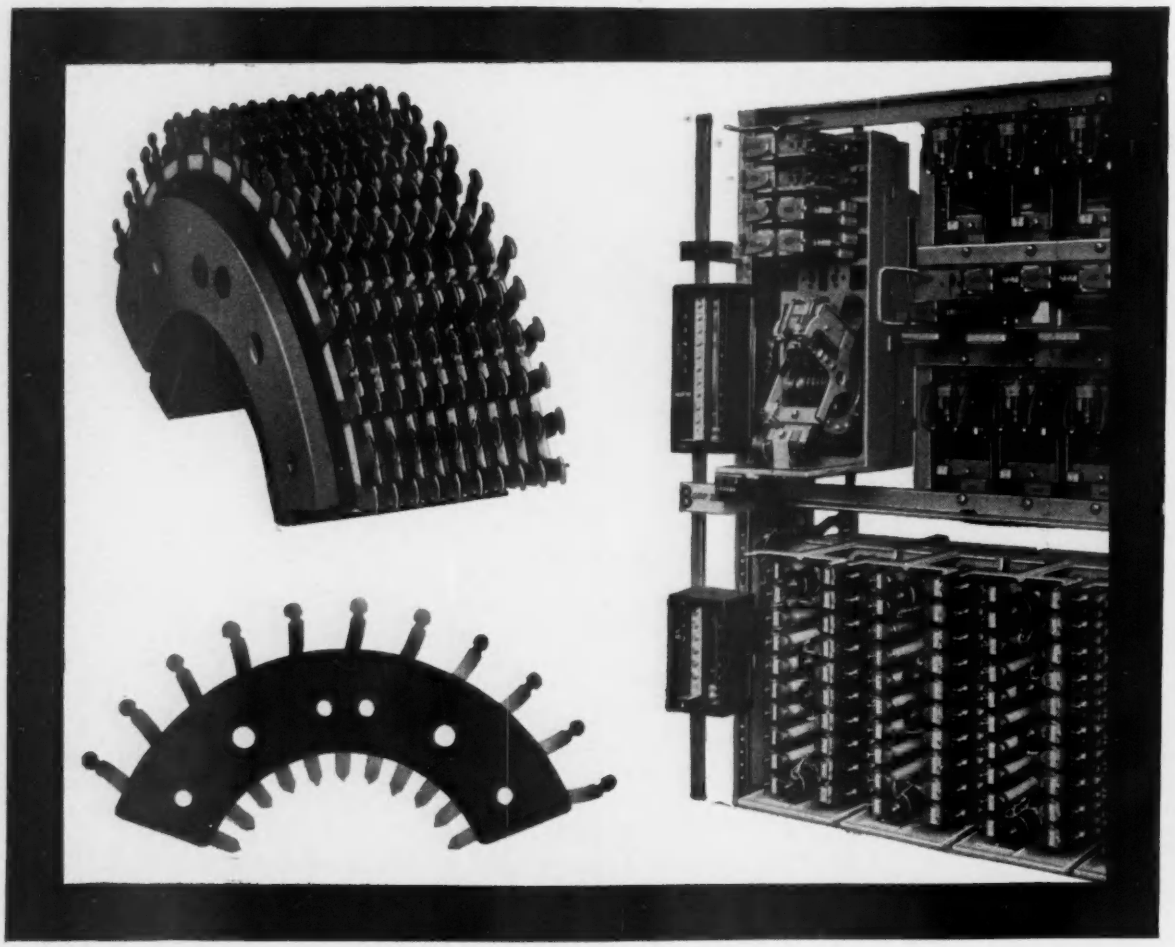

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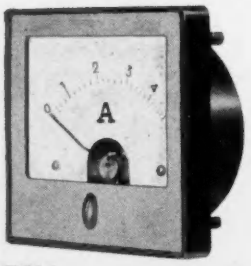

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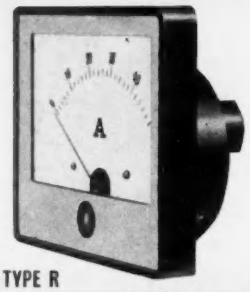

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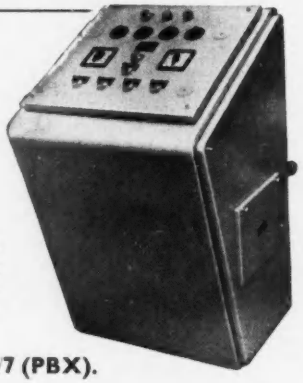

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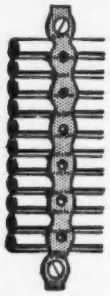

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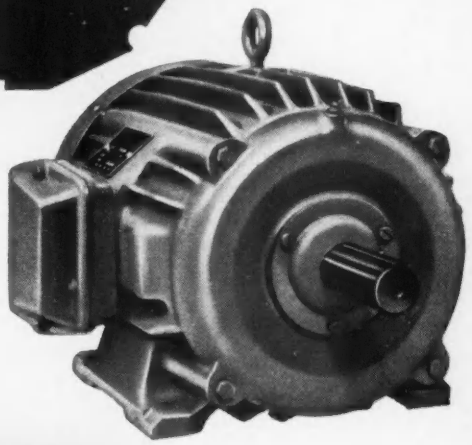

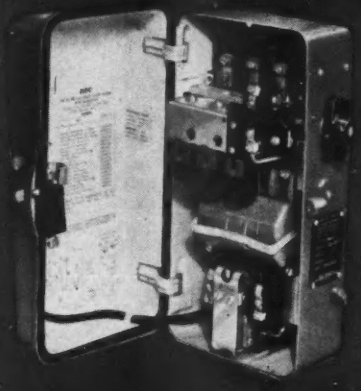

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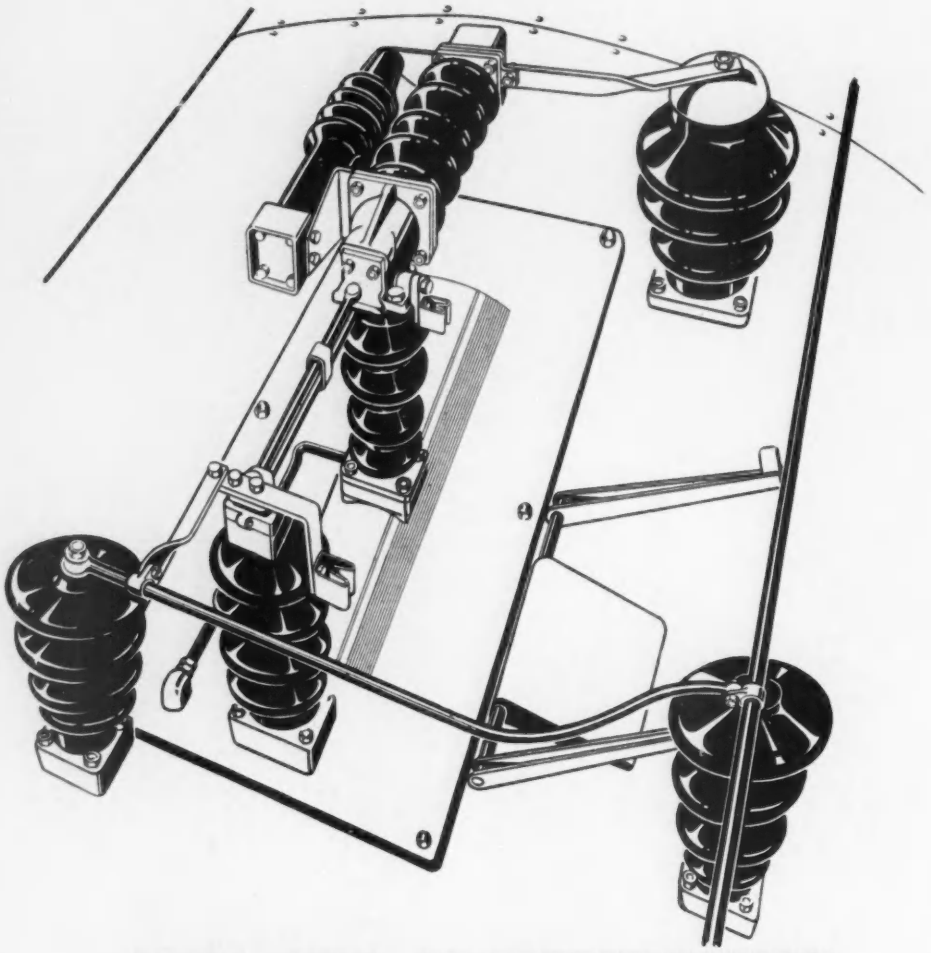

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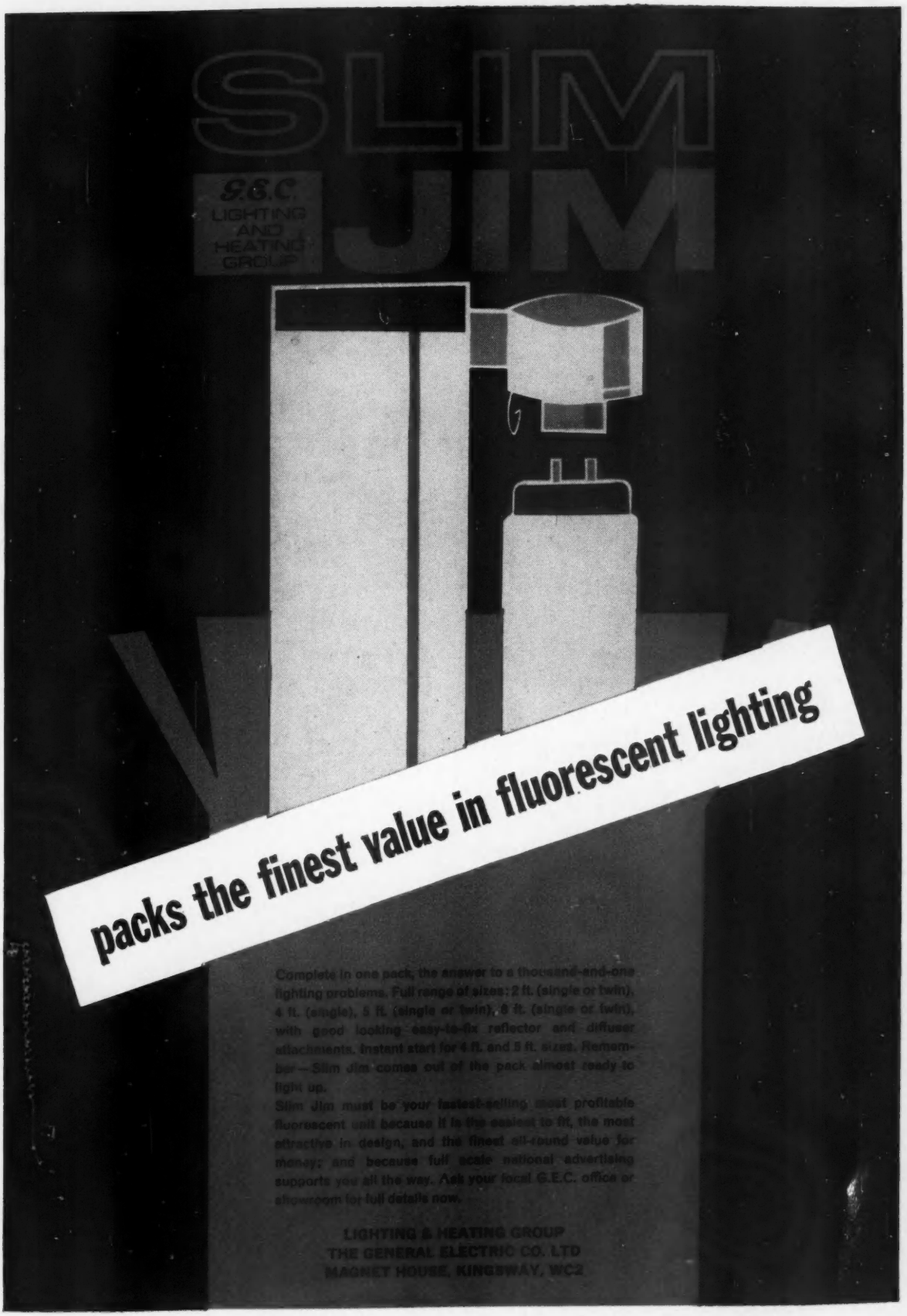
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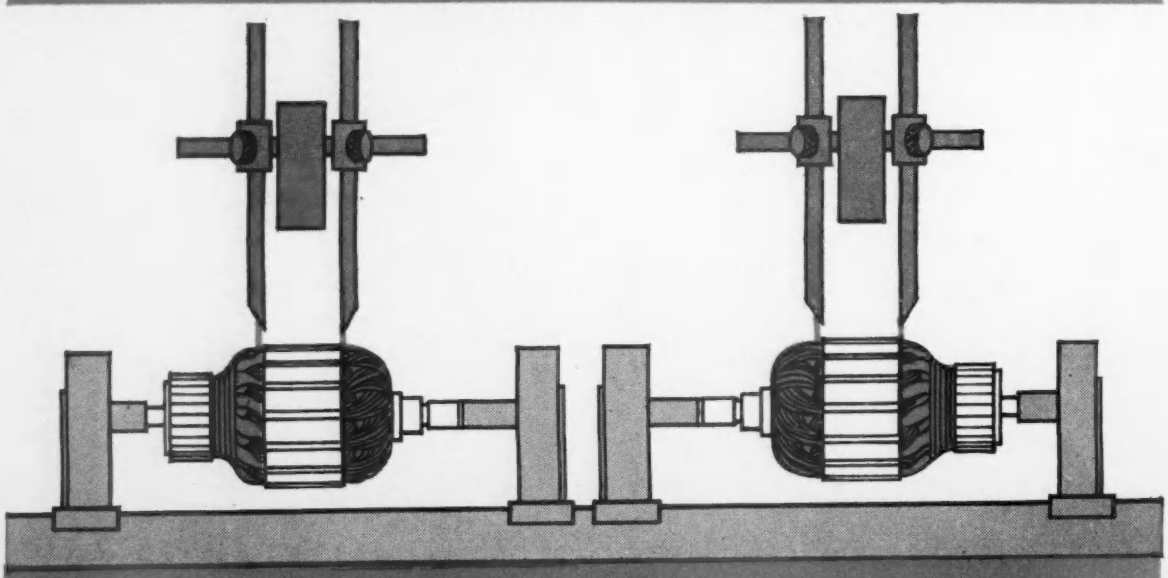

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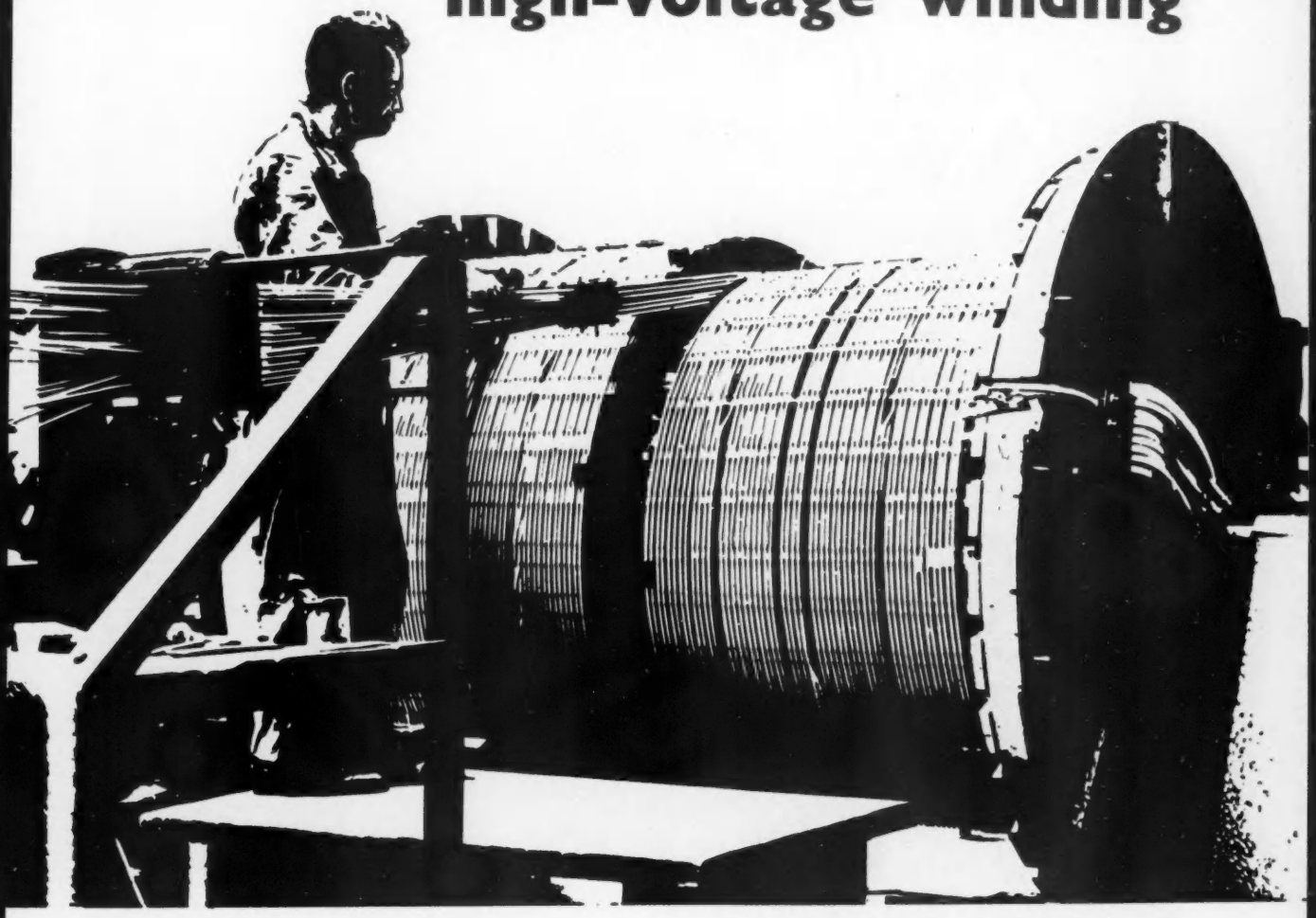
ST. 31

high-voltage winding



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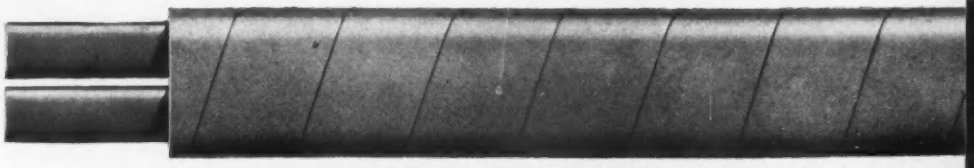

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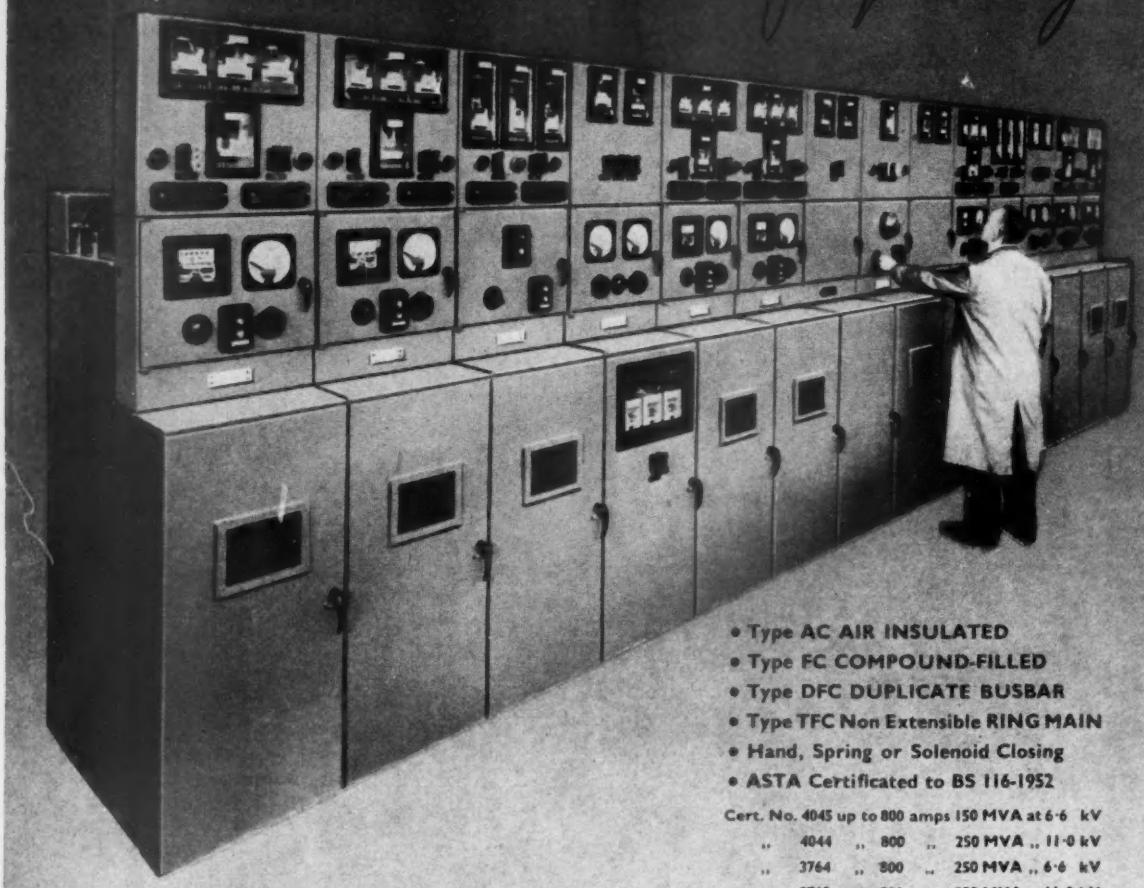

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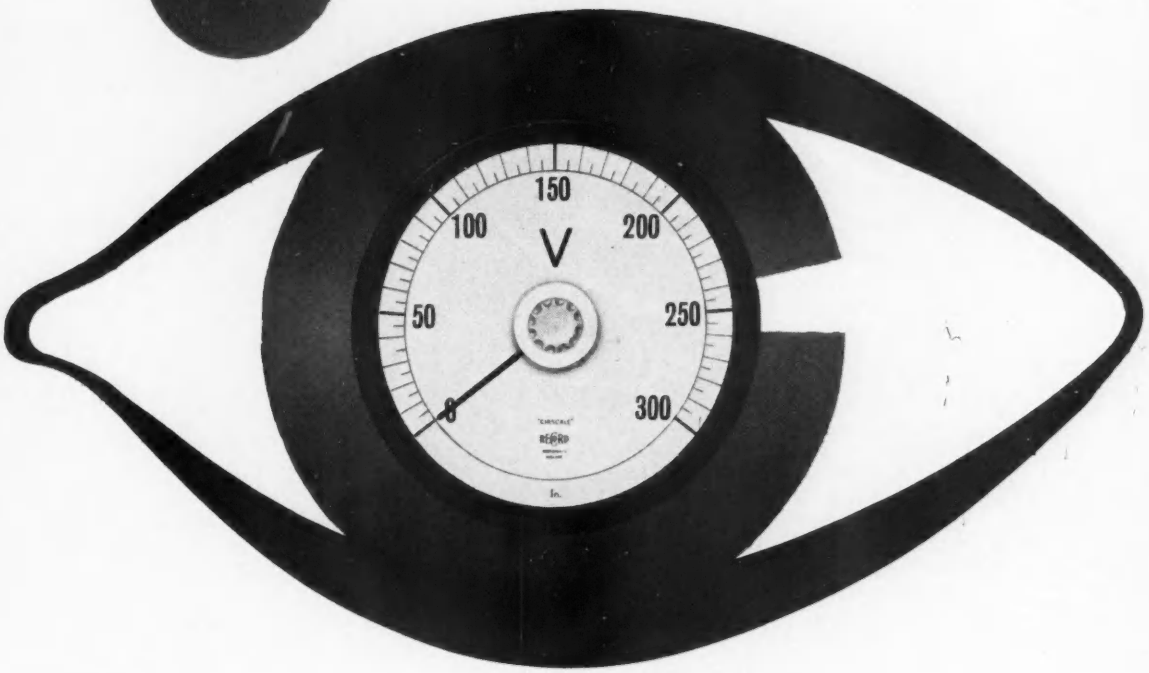

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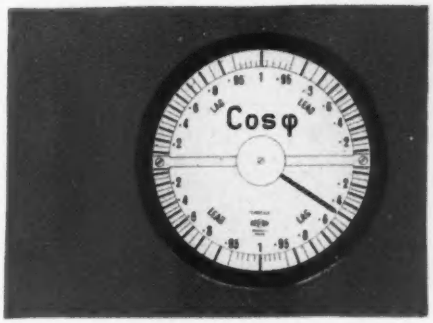

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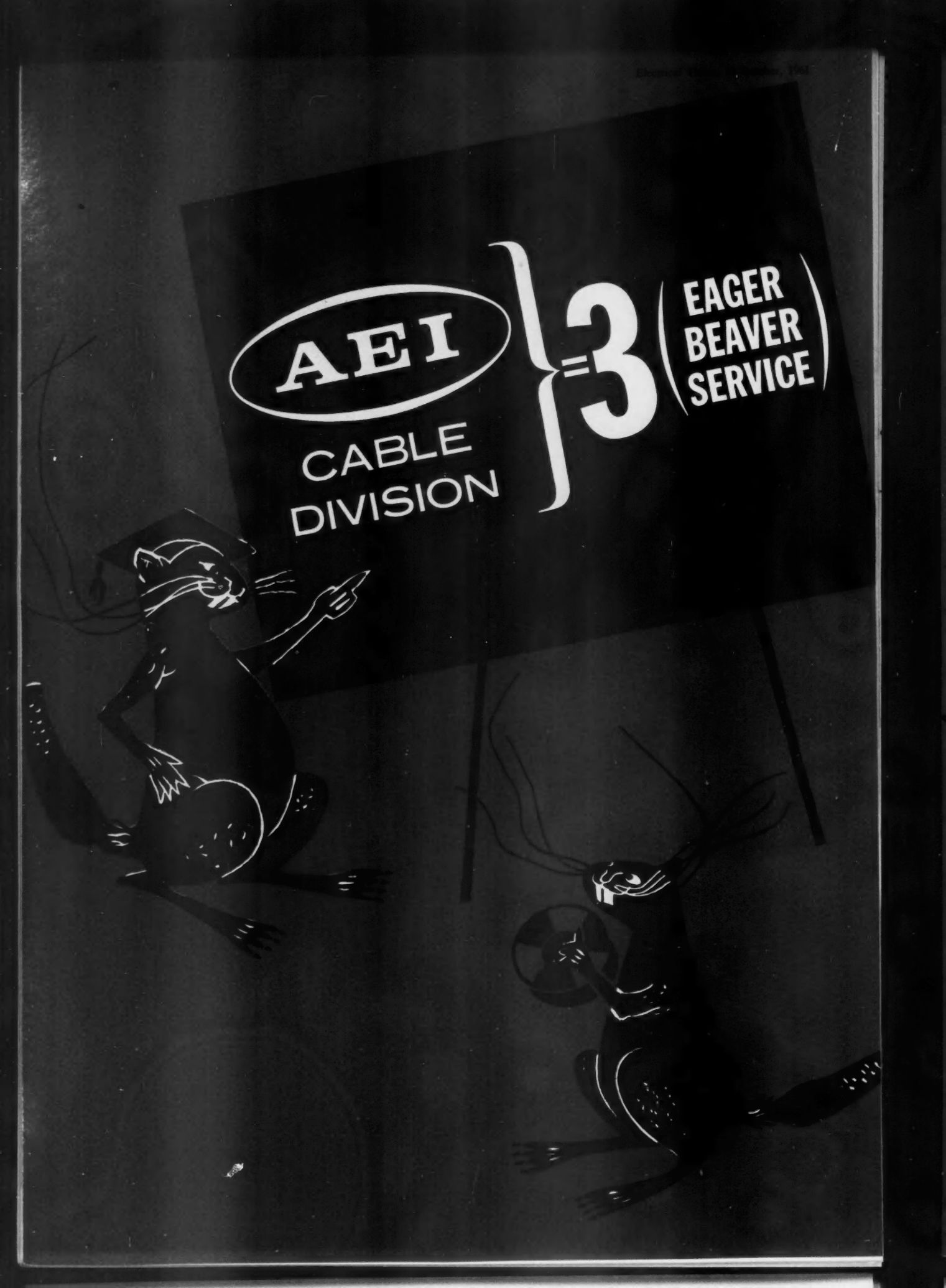
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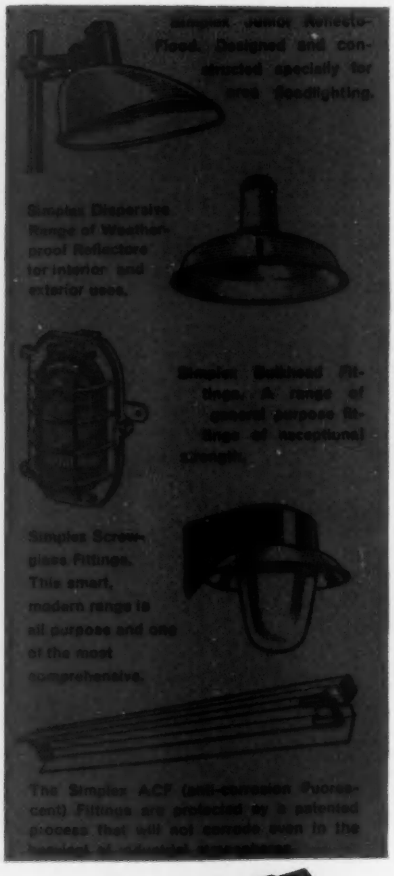

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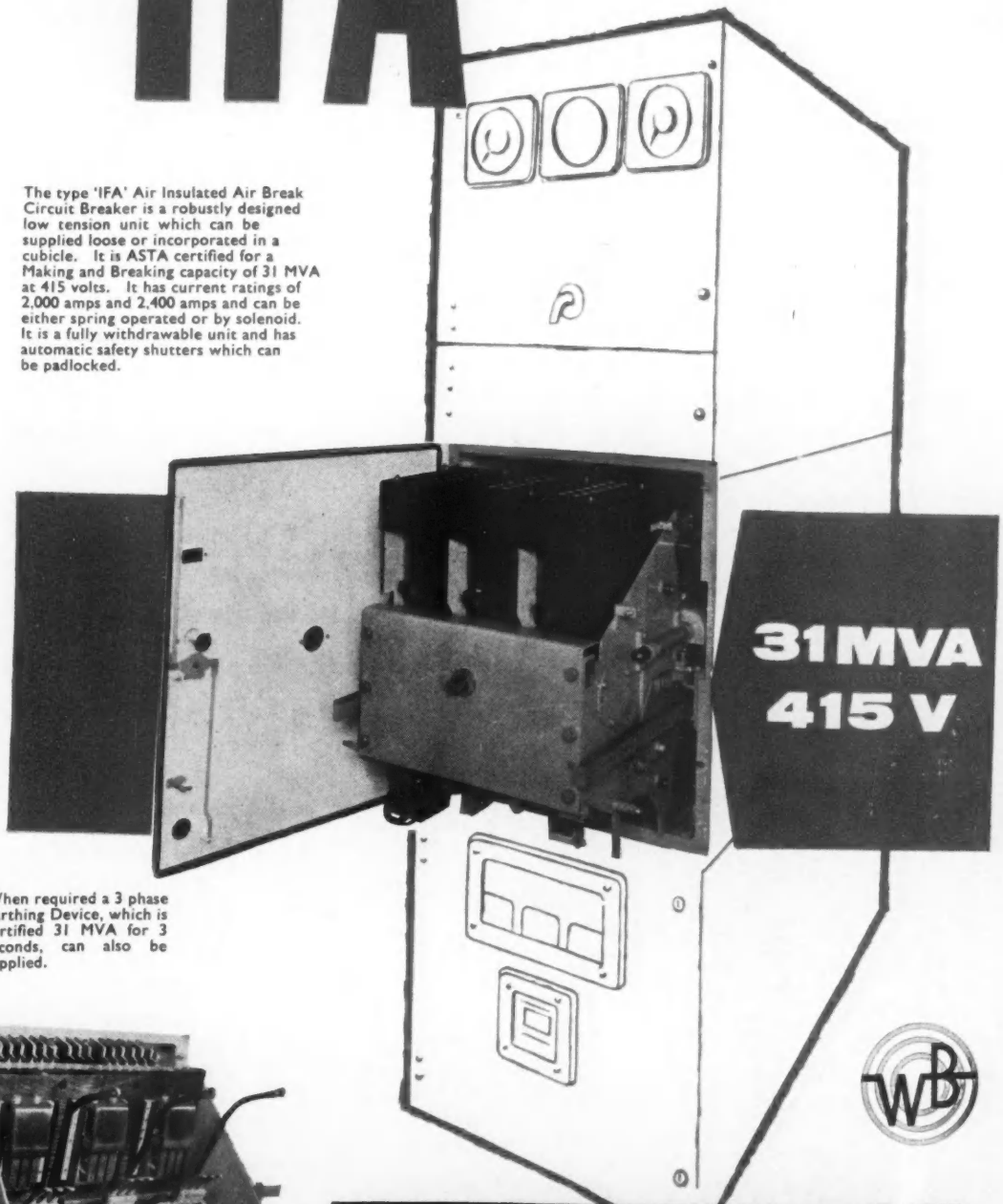

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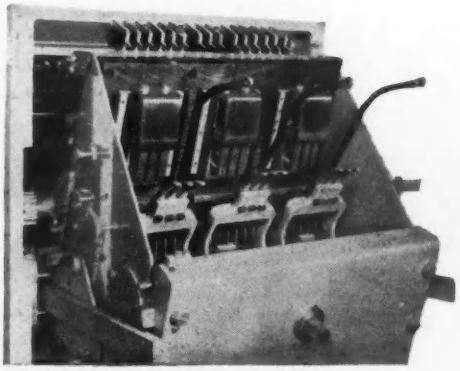

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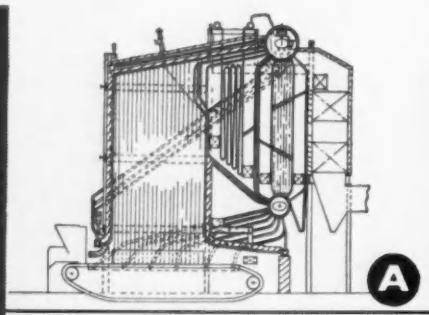

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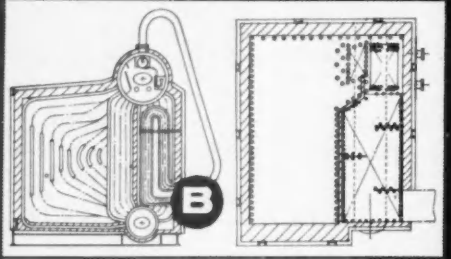

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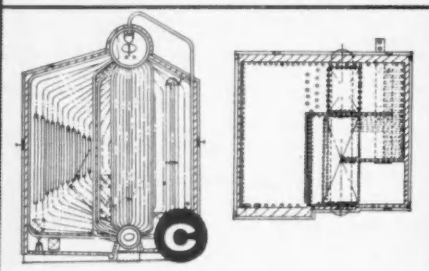

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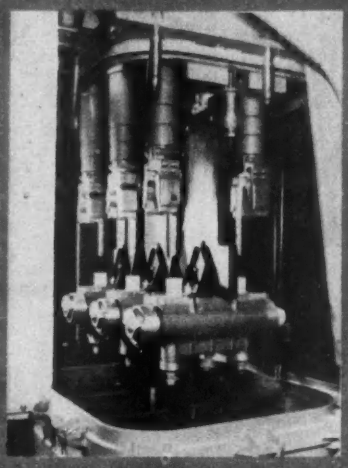

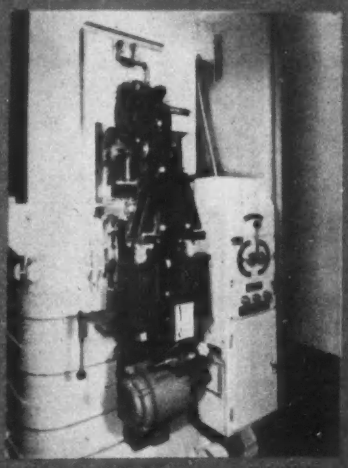

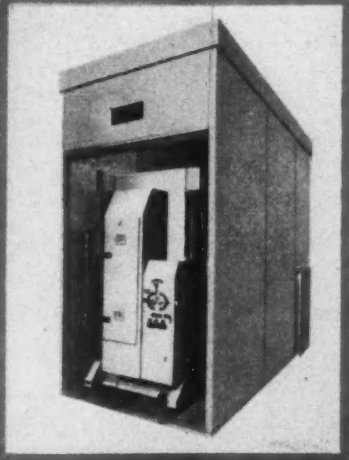

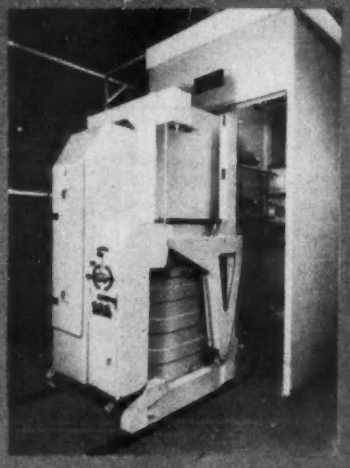

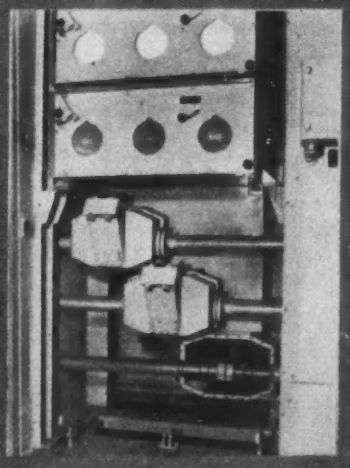

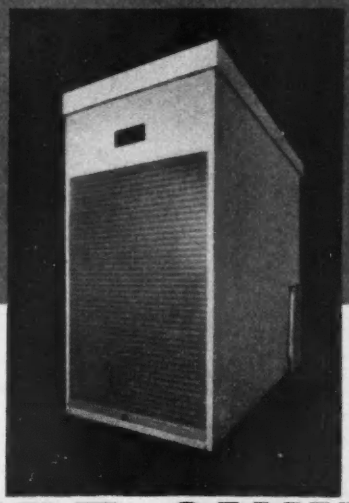

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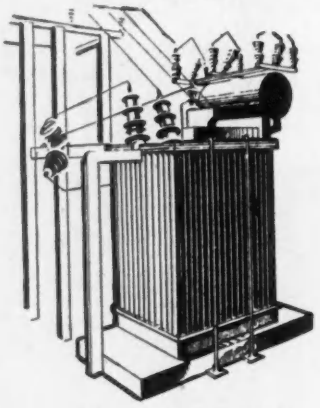

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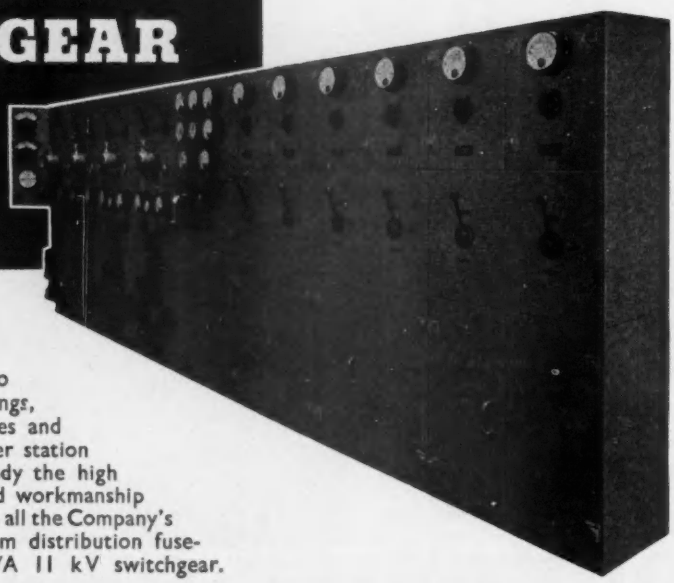

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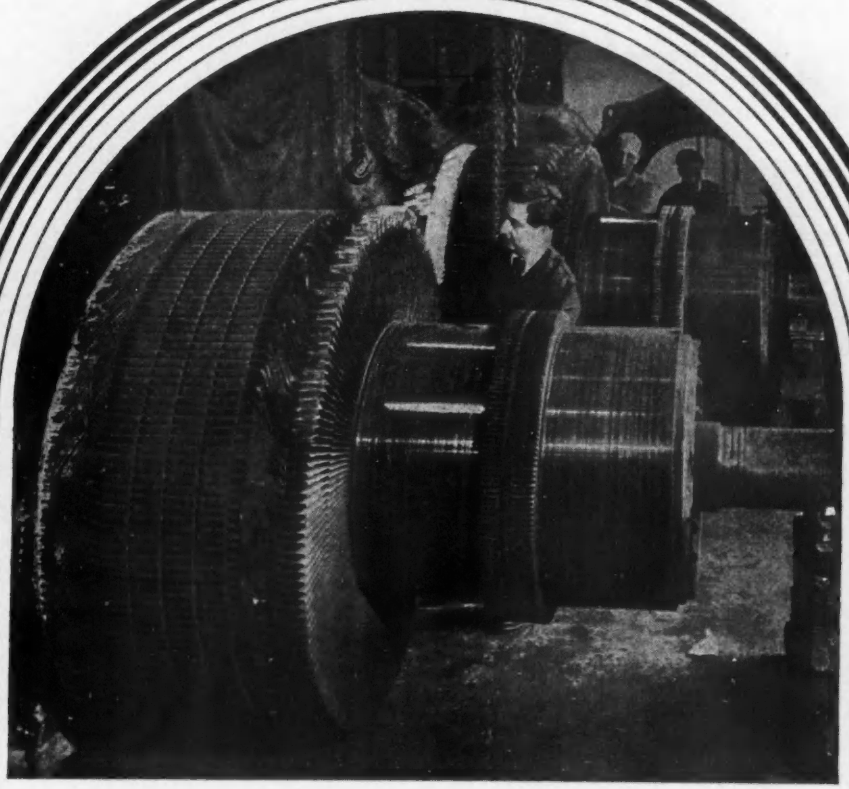

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THURSDAY 12 OCTOBER, 1961
Registered as a Newspaper Volume 140 No. 15

ELECTRICAL TIMES

SARDINIA HOUSE, SARDINIA STREET, LONDON, W.C.2
Telegrams: Equivolt . Estrand Telephone: HOLborn 6016

Dans ce numéro

Entraînement de laminoir alimenté par convertisseur 517

Des convertisseurs à arc de mercure sont utilisés pour alimenter le moteur de 2350 ch entraînant un laminoir réversible servant au laminage d'acier inoxydable. On se sert d'amplificateurs magnétiques dans les circuits de commande, dans lesquels on prévoit la limitation du courant du moteur, cette limitation constituant un moyen de réduire au minimum les fluctuations de la tension d'alimentation. Le courant du champ du moteur est extrait d'un excitateur conventionnel, avec commande par amplificateur magnétique. Les améliorations envisagées pour ce genre d'entraînement comprennent d'une part la commande du régime moteur effectuée par des convertisseurs, afin de donner des inversions de champ plus rapides: 0,35 sec comparées aux 0,7 sec avec les dispositions actuelles; d'autre part le remplacement des amplificateurs magnétiques par des amplificateurs transistorisés.

Disjoncteur de 650 kV à air comprimé 523

Une gamme récemment présentée disjoncteurs à air comprimé peut se prêter à des tensions de système comprises entre 132 kV et 650 kV, des courants de 2000 A ou 4000 A et des intensités en court-circuit de jusqu'à 60 kA. Des disjoncteurs de 400 kV dans cette gamme ont été commandés pour le système britannique. Les disjoncteurs peuvent comporter jusqu'à 10 têtes interruptrices en série par phase. Les contacts par lesquels passe le courant sont verrouillés mécaniquement tant en position ouverte qu'en position fermée, et font l'objet d'une pression totale d'air. Grâce à cela, il n'est pas nécessaire d'avoir un isolateur distinct sur le disjoncteur. La rupture s'effectue en deux cycles et demi.

In dieser Nummer

Stromrichtergespeister Antrieb für ein Walzwerk ... 517

Zur Speisung eines 2350 PS Motors, der ein nichtrostenden Stahl produzierendes Reversierwalzwerk antreibt, wird ein Quecksilberdampfstromrichter verwendet. In den Steuerkreisen, die Vorkehrungen zur Begrenzung des Motorstroms und zur Herabsetzung der Speisespannungsschwankungen umfassen, kommen magnetische Verstärker zur Verwendung. Der Erregerstrom für den Motor wird von einer gewöhnlichen, durch magnetischen Verstärker gesteuerten Erregermaschine geliefert. Die in Antrieben dieser Art ins Auge gefassten Verbasserungen umfassen Stromrichtersteuerung der Motorgeschwindigkeit zwecks Erzielung einer schnelleren Feldumkehr, nämlich 0.35 Sek. anstatt der 0.7 Sek in den gegenwärtigen Einrichtungen, sowie die Verdrängung magnetischer durch transistorisierte Verstärker.

650 kV Druckluftsschalter 523

Ein neuerdings eingefuhrter Satz von Druckluftsschalter eignet sich für Netzspannungen von 132 bis 650 kV, Ströme von 2000 bis 4000 A und Kurzschlussströme bis zu 60 kA. Für das britische Netz wurden 400 kV-Schalter aus diesem Satz bestellt. Die Leistungsschalter können pro Phase bis zu 10 in Reihe liegende Trennköpfe besitzen. Die stromführenden Kontakte sind sowohl in der Offnungs- als auch in der Schliesstellung mechanisch gesperzt und dem vollen Luftdruck ausgesetzt. Demzufolge erübrigt sich bei diesem Leistungsschalter ein eigener Trennschalter. Die Unterbrechung erfolgt innerhalb von 2½ Perioden.

Rolling Stainless Steel 517
by R. B. Larkinson, M.A., A.M.I.E.E.

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SUBSCRIPTION RATES: United Kingdom £4, Overseas £4 10s per annum. Canada and USA $12 per annum. Subscriptions are payable in advance and may commence with any issue. Overseas subscriptions may be paid by banker's draft, cheque, international money order or credited to the Electrical Times Ltd., at Coutts and Co., 440 Strand, London WC2. Single copies price 1s 6d. Postage 6d.

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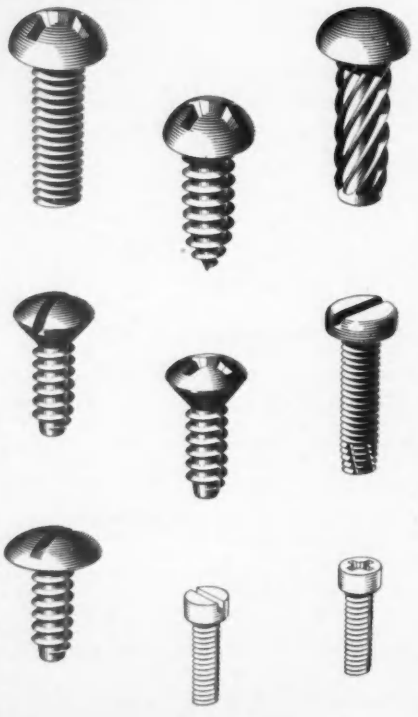

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ELECTRICAL
TIMES

ESTABLISHED 1891

THURSDAY, 12 OCTOBER, 1961

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Comment

OFF-PEAK MANOEUVRES

Outstanding feature of the bulk supply tariff for 1962-63, which the CEGB announced last week, is that area boards will pay less for energy they take between 11 p.m. and 7 a.m. than for that taken during the rest of the day. The differential is 0·11d/kWh and it will stay at that figure irrespective of variations in fuel cost. Introduction of this concession is accompanied by a negligible change in the daytime running cost, which at 0·85d based on 85s/ton fuel cost is a few thousandths of a penny/kWh below the figure that applies at present. A clear question that arises for area boards is how much of this reduction they will be able to pass on to consumers operating on off-peak tariffs. In evaluating that, an important factor for them to consider will be the rather late starting hour of the low rate relative to that for most off-peak tariff permitted hours. The commonly adopted starting time is 7 p.m. for the charging of, say, thermal storage systems, and designers will not wish to lop anything off that. Moreover, at present, most systems start charging as soon as supply is available. So, even without a midday boost taken into consideration, only about two-thirds of the energy input for an off-peak consumer would be taken at the reduced cost rates of the BST; and for tariff-design purposes, little more than half could safely be assumed. The average price paid by the boards for units supplied to off-peak consumers would still be reduced by nearly 10%, which gives some room for manoeuvre. But there are trends in cost estimates which suggest that off-peak kWh charges should, in the absence of the present reduction, have moved upwards to match higher distribution costs involved for the area boards. So aggressive unit cost reductions cannot be taken for granted, and area boards will have to look closely at the various temperature-sensitive systems for controlling off-peak input.

ALL-CHANGE TARIFF

Although it is the introduction of a night charge that stands out in the new tariff, there are, in fact, changes all round. The increase of 13s in the kW demand charge is accompanied by an alteration in the method of calculating what each area board shall pay, which relates that sum to the half-hour of CEGB peak demand subject to a new system of averaging. The results of this change concern only the area boards. For CEGB accounting, the tariff writes in a guaranteed receipt of £232 million by way of fixed charge, leaving only the kWh charge subject to the vagaries of the future. An alteration in the coal cost adjustment, already mentioned, brings the tariff-quoted figures nearer today's experience, since the 85s base

compares with a current payment of about 91s/ton for 11,000 B.Th.U. fuel, allowing for transport. There is a reduced cost correction factor which appears to be based fairly enough on an average efficiency of generation of 28%—it stands in contrast to the 0·0007d/1d/ton of the vesting BST, which implied 20% efficiency. Other changes are relatively minor, affecting the already long list of definitions which complicate the tariff, but making a difference for only a few consumers, notably those on CEGB interruptible supply terms.

THREE-FORKED PROFESSION

The split of electrical engineering into power and electronics is a much-discussed problem these days. If the split is fundamental, then a difference in treatment of the electrical engineer according to which speciality he chooses to follow ought to begin in the first year of his professional education. If there is sufficient common ground and common interest to make the split illusory, then a common pattern of training may well be the better approach. Mr G. S. C. Lucas, in his inaugural address as IEE president, combined a worth-while statistical exercise on engineering manpower in Britain and abroad with some broad thinking about current problems of electrical engineering. In the address, he comes down heavily on the side of "one profession." His line of argument is novel. He claims to recognise a third speciality in electrical engineering, the "application engineer." This technologist has a smattering of knowledge right across the field of electrical engineering, but his expertise is cemented by his knowledge of how electrical engineering is applied in one particular branch of industry—or, presumably, of how it ranks as important in some particular activity, such as education. Must those who are convinced that power engineering and electronics engineering are two separate professional disciplines accept a third, then? The very fact that this third speciality spans the other two argues against the acceptance of the idea. And, it might be added, the present trend of power engineering suggests also that the power-electronics gap is less fundamental than it seemed a decade ago.

RAILWAY SUCCESS

When failures of equipment cause widespread alterations to railway timetables, everyone hears about it. The troubles with 50 c/s electrification on British Railways have had a lot of publicity. The successes, as BTC assistant chief electrical engineer Mr J. A. Broughall wryly observed recently, have not been so fully recorded. He was speaking in Brazil, presenting a paper which offers the first comprehensive estimate of early operating experience with the British mains frequency rail electrification system. What he had to report thoroughly backs up the implications of that comment. There is a remarkable story of success that accompanies the initial operation of the electrification system. Much of the plant reported on by Mr Broughall merits such judgments as "has behaved excellently" and "has functioned perfectly." Moreover, economically attractive as the scheme was in relation to d.c. working, research and experiment subsequent to the dates on which design decisions had to be taken has established that still further economies are possible. New materials and new techniques are matching well with the a.c. system, notably the growing range of semiconductor rectifiers available, which can offer space and weight savings as well as eliminating the risk of back-firing inseparable from mercury-arc rectifiers. Where failures have occurred, notably with some transformers—quite unexpectedly, since their reliability is a byword in electrical planning—and motors, there seems a strong possibility that it is associated with the change to 6·25 kV enforced by clearance considerations on some parts of the British rail network. Such changes would not be so necessary in overseas railways; and, anyway, know-how on dealing with them has now been obtained, albeit expensively. The overall conclusion that Mr Broughall reaches is worth weighing, in the knowledge that he represents an operating concern, not a manufacturer. "The decision to adopt the 25 kV, 50 c/s system, even in the particularly unfavourable conditions in Great Britain, is sound, and the dual voltage 25/6·25 kV version of that system can also give a satisfactory account of itself when circumstances demand its use."

ROAD LIGHTING REVISION

Whatever the views of the more advanced thinkers on road illumination, the general pattern of lighting will be set by the official code of practice, which will give lighting authorities a firm claim on local and national moneybags. The present code has been in use for some 20 years. At the APLE Conference last week, a draft revision produced by a widely representative committee had an airing. Comment may bring about substantial modification of the code, but it has a number of features which commend it. The present two-classifications-only approach to roads from the lighting aspect is replaced by five, with a "special requirements" section to come as well. Changes for each class of road are summed up in the foreword to the code as "a trend towards installations having about the same spacing as at present, but with greater mounting height, more light and less glare." It is typical of current considerations that a greater flexibility of design of individual lamp-posts and lanterns is provided for, to meet visual amenity requirements. A notable introduction is recognition of the physical existence of lamp-posts from the road accident aspect. Columns are required to be set back at least 5 ft from the carriageway on all roads where speeds above 40 m.p.h. are permitted, and 18 in. back at least on other roads. That is a recommendation which will outdate most existing installations if it is accepted.

Meteor

This week's quick summary of electrical news faces advertisement page 20

Rolling stainless steel

CONVERTER FEED FOR REVERSING MILL

by R. B. Larkinson,* M.A., A.M.I.E.E.

WHEN a motor has to supply a large horsepower at variable and easily reversible speeds it is necessary to use a d.c. motor. Usually the supply source for the motor is an Ilgner set, which consists of an induction motor, usually fed from the 11 kV system, a flywheel to absorb peaks of power demanded from the set, and the generators which supply power to the motor. Another integral part of the Ilgner set system is the slip regulator which, as the induction motor slows down on taking load, inserts resistance into the rotor circuit, thereby limiting the amount of current taken by the motor.

An alternative source of supply which is being used more and more in place of Ilgner sets is the mercury-arc converter.

In the Ilgner set drive, the manner in which the power supply energy is converted into d.c. motor energy is that the electrical energy of the supply is converted into the mechanical energy by the induction motor, the mechanical energy of the induction motor is converted partly into kinetic energy of the flywheel and partly into electrical energy in the d.c. generators, and the electrical energy from the d.c. generators is converted to mechanical energy in the d.c. motor.

The disadvantages of this scheme are that the conversion from electrical energy to mechanical energy and back again is obviously wasteful; the Ilgner set consists of heavy pieces of rotating machinery which needs expensive foundations and constant maintenance; and the field of the generators, which is the means of controlling the flow of power, has a high electrical inertia. An advantage is that it has the ability to soften the effect of sudden peak power demands.

A converter installation does not require expensive foundations—the layout of the equipment is more flexible and can be disposed on two or three different floor levels. The total space occupied will generally be less than that required by the equivalent Ilgner set. Converters require little maintenance, and the grid control system as a whole has a very low electrical inertia. However, a converter installation can have no energy storage facility and, consequently, the effect on the supply can be quite considerable if the system has low short-circuit capacity. With the increasing capacity of the electrical supply system, this disadvantage of converter drives is becoming less important.

Control

A feature of the converter which is not possessed by the Ilgner set is that current can flow through it only in one direction. Consequently, for reversing duties, either two sets of rectifier equipment have to be used to pass current in both directions or the motor has to be switched so that with unidirectional current opposite directions of rotation can be obtained. This switching can be performed either on the motor armature or on the motor field.

These three methods of applying converters are illustrated in Fig. 1, where (a) is the back-to-back method, (b) is armature reversal and (c) is field reversal.

The back-to-back method is wasteful inasmuch as only half the converter equipment can be used at a given time. The armature reversal method has the disadvantage of using a mechanical switch which must be capable of carrying large currents and must be able to perform millions of operations every year. If the motor field is reversed, then to obtain quick reversal times a large amount of forcing must be used to overcome the high electrical inertia of the field.

This article describes a field reversal scheme installed at Samuel Fox Stocksbridge Works. The motor is 2,350 h.p. with 2,060 A full load current at 930 V. The field on the motor was designed so that full excitation could be obtained when 633 A were flowing through it. At this current the voltage across the motor field is 33 V. This low voltage and high current were used so that the motor exciter could apply nearly 17 times forcing to the field without having to go to excessively high voltages. In fact,

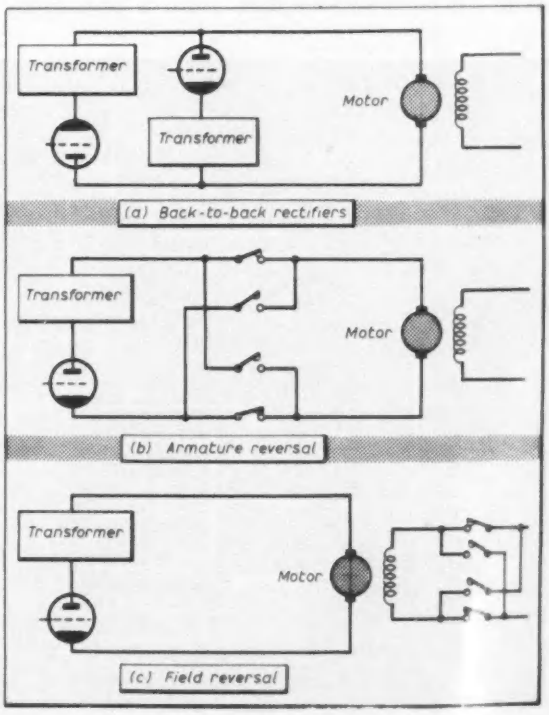


Fig. 1. Three methods of applying converters to reversing drives

* Mr Larkinson is with Metal Industries Division, English Electric Co. Ltd.

D*

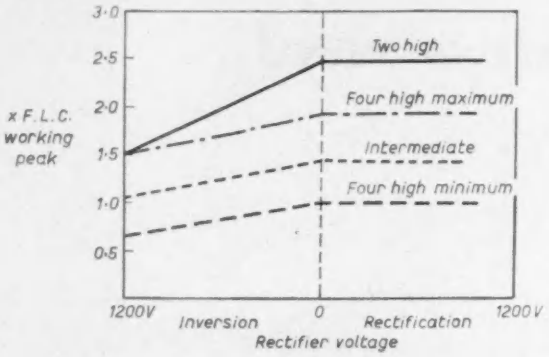


Fig. 2. Working peaks permitted by the current-limiting circuits, for various amounts of inversion and rectification

the peak of the motor exciter is 550 V, which allows a field reversal time of 0·7 sec to be obtained.

The mill can be used either for jobbing or for rolling sheet, and can be operated as a two-high or a four-high mill. The drive to the two work rolls comes from the motor via a pinion box. In the two-high condition the mill motor speed can be controlled up to 35 r.p.m. by variation of the converter voltage, and from 35 r.p.m. to 90 r.p.m. by variation of the motor field. In the four-high condition the motor operates with its field permanently weakened and the speed is varied from 0 r.p.m. to 90 r.p.m. by control of the converter volts.

Torque and Current Limitations

The current limitations of the motor require a restriction of current in the speed range 70 r.p.m. to 90 r.p.m., and in the four-high condition an adjustable current limit is required. Table 1 shows these conditions.

When reversing the motor, a satisfactory reversal time can be obtained if no more than 1½ f.l.c. is taken. Moreover, the dip in the supply system voltage is proportional to the current passing through the converter in either the rectification or inversion mode. Thus, since the motor is never supplying load when the rectifier is in inversion and 1½ f.l.c. is satisfactory for reversals it is advantageous from the power system point of view to limit the current taken on inversion. Therefore, the converter is allowed to take only 1½ f.l.c. at full inversion, increasing steadily to 2½ f.l.c. at rectification. The characteristics required for the current limit are as in Fig. 2.

The top curve shows the working peaks at various amounts of inversion and rectification in the two-high condition, and the three curves below it, three working peak levels obtainable for the four-high condition.

Controlling Elements

The conditions which had to be filled by the drive have been stated and in Fig. 3 a block diagram is given showing the principles of operation of the drive, indicating the means by which these conditions are satisfied.

The elements controlling the converter voltage are the DMA (driver magnetic amplifier) and the GCU (grid control unit). The time constants of these control elements are extremely small when compared with generator field time constants (2 sec approximately) on an Ilgner set. Thus, the voltage response of the rectifier is very quick and any change in reference would produce such a rapid change of voltage that the drive would always be changing speed in current limit. This is undesirable, so an integrator is used between the reference and the speed reset from the tacho generator.

The means of obtaining this integration of command variation is shown in Fig. 4.

The reference voltage is compared with the output of the RMA (ramp magnetic amplifier) and any difference sends a current through the magnetic amplifier winding in such a way as to decrease the difference. However, a zener clipper Z_c, a device which has virtually infinite impedance up to a certain voltage and virtually zero impedance above

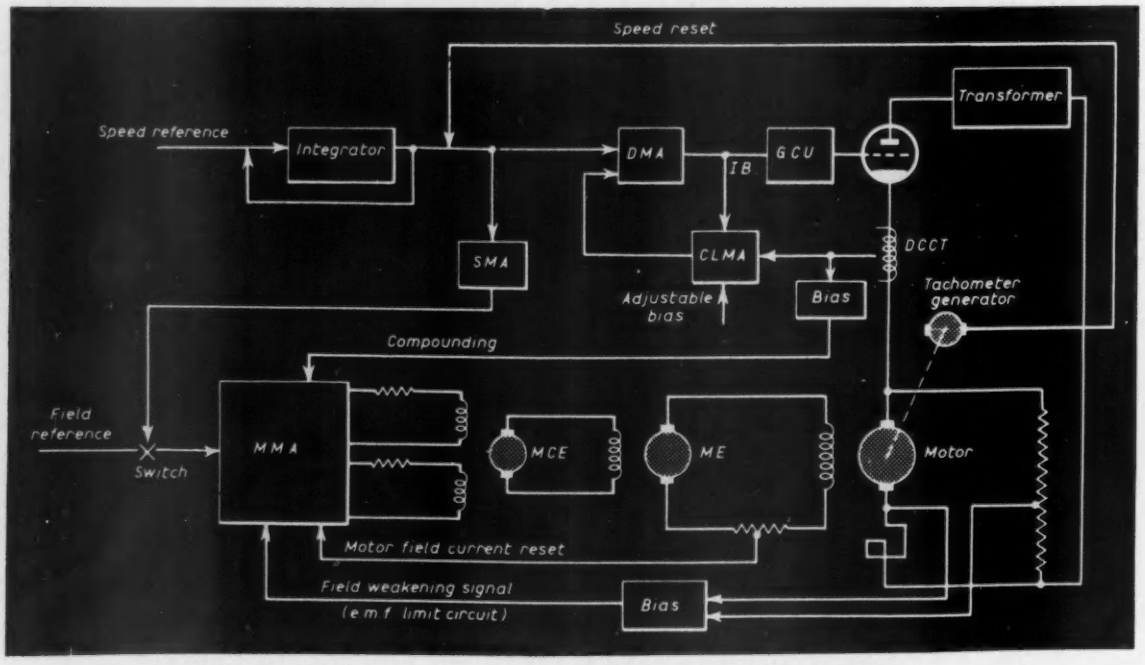


Fig. 3. Block diagram of rolling mill drive and control, illustrating principles of operation

this voltage, limits the voltage across the resistor R1 and the RMA winding, and thus limits the current flowing in the winding. Thus, for any small error between RMA output and reference a constant current is passed through the RMA winding in such a direction as to decrease this error. The RMA, by means of positive feedback, acts as an integrator of the constant current and produces a smooth ramp output. It should be noticed that if the resistance is decreased, then a larger current can flow in the RMA winding and the rate of integration is consequently increased.

The servo principles of the integrator are shown in Fig. 5.

Ignoring for the moment K_3D, we see that

$$(\theta_i+K_2\theta_o).K_1/(1+t_1D)=\theta_o$$

$$\therefore K_1\theta_i=(1+t_1D)\theta_o-K_1K_2\theta_o$$

Thus, if we make $K_1K_2=1$

$$\theta_o=(K_1\theta_i)/(t_1D)$$

Thus, the output is an integration of the input.

If we now add K_3D

$$(\theta_i+K_2\theta_o-K_3D\theta_o).K_1/(1+t_1D)=\theta_o$$

and therefore

$$(\theta_o=(K_1\theta_i)/(t_1+K_3K_1)D$$

Thus, by adding negative rates of change feedback, we can vary the integration rate.

Returning to Fig. 3. The output of the integrator is compared with a speed reset from a tachometer generator which is direct-driven from the motor to avoid gearbox backlash. The resultant error goes into DMA, whose output feeds into the grid control unit which controls the firing angle of the converter. A signal of armature current is obtained from DCCT and is fed into CLMA (current limit magnetic amplifier). This amplifier is single ended and the current limit bias, i.e., the point up to which the current limit is inoperative, can be varied by altering the amount the amplifier is driven in the backward direction. The output of the DMA is a measure of whether the converter is in inversion or in rectification and the circuit IB in Fig. 3 has the characteristics shown in Fig. 6; (a) being obtained for the two-high and (b) for the four-high condition, thus giving the required variation in current limit with state of inversion or rectification of the converter. Also into CLMA goes a manually adjustable signal to vary the bias, which is for use in the four-high condition. The CLMA output goes into DMA to control the converter volts when necessary. Also from the DCCT, a signal is taken which is opposed by a bias corresponding to 1½ times f.l.c. and above this value a signal is fed into MMA (motor magnetic amplifier) whereby it increases the motor field current. At base speed this will have negligible effect on the field flux because of the saturation in the motor field, but at higher speeds this compounding signal will have a much larger effect and will give the desired result as indicated in Table I.

Table 1. Current Limits

Torque Range	Speed Range R.P.M.	Working Peak Torque Metre-Tons	Working Peak Current Limit × F.L.C.
Two High	0/35	120/120	2·5/2·5
	35/70	120/60	2·5/2·5
	70/90	60/35	2·5/1·87
Four High	0/90	20/20 to 35/35 (Adjustable)	1·07/1·07 to 1·87/1·87 (Adjustable)

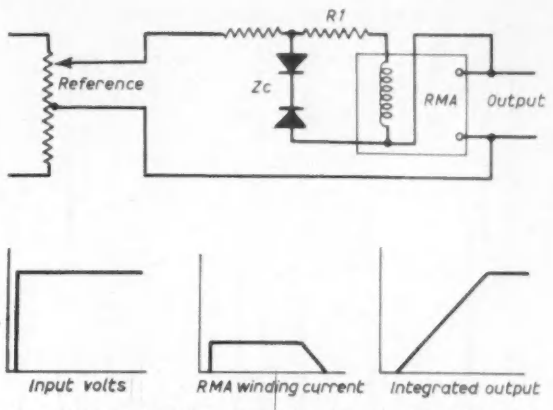


Fig. 4. Method of obtaining integration of command variation. Zc is a zener clipper

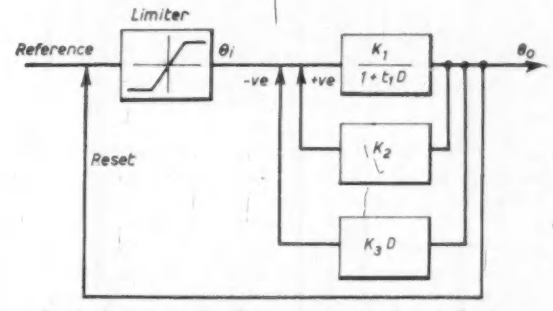


Fig. 5. Servo principles of integrator circuit shown in Fig. 4.

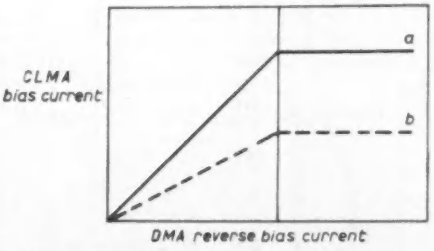


Fig. 6. Characteristics of circuit at IB (Fig. 3); (a) refers to the two-high condition and (b) to the four-high. The result is variation of current limit with state of inversion or rectification

The field of the motor exciter is controlled by a control exciter (MCE), which is in turn controlled by a push-pull magnetic amplifier (MMA). The field reference (full field for the two-high condition, weak field for the four-high) is fed into MMA and a reset signal proportional to field current is compared with it magnetically in MMA and the difference amplified to give the correct field current.

When the operator wishes to reverse the drive, he moves the controller. As the signal into the integrator has reversed and the drive as yet has not, there is a low resistance path to the RMA winding through either a forward or reverse contact and a rectifier, which ensures that the RMA output decreases quickly. When the integrated output comes below that of the tachometer reset, then the SMA (switch magnetic amplifier) which acts in a flip-flop manner, receives a signal and operates a relay to reverse the motor field reference. At the same time, a hold signal is applied to the RMA so that its output is kept near to that of the tachometer generator. During this time the DMA goes to zero output and the converter comes to the full inversion position. While the field is changing over the input

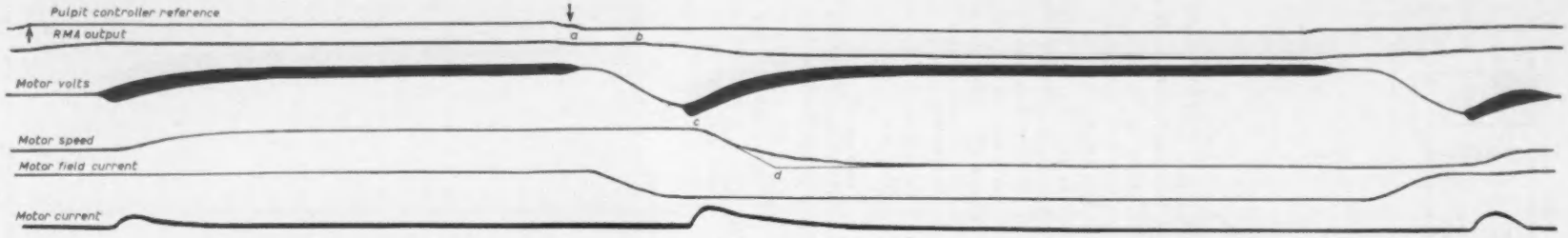


Fig. 7(a). Traces obtained with mill in two-high arrangement. Control sequence, off-to-base and base-to-base, i.e., 0 to 35 r.p.m., 35 r.p.m. to 35 r.p.m. in reverse direction, with no field weakening occurring. Note drop of RMA output to hold position (a) where it remains until the polarised relay operates at (b). Total time of reversal, 2·7 sec. (c) and (d) are reversal points for linear control (0·8 sec)

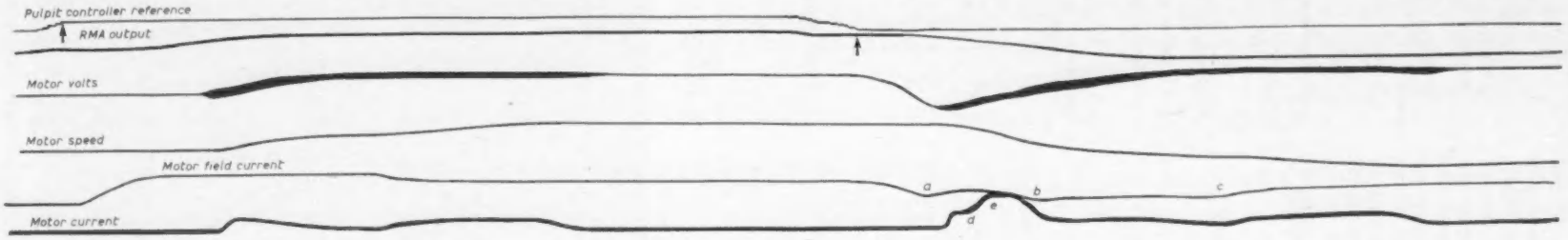


Fig. 7(b). Traces obtained with mill in two-high arrangement. Control sequence, off-to-top speed and top-to-top speed, i.e., 0 to 90 r.p.m. and 90 r.p.m. to 90 r.p.m. in reverse direction. Note field current overshoot of weak field value at (a). Base speed is reached at (b) in one direction and (c) in the other. Motor current is held low while drive is at full inversion (d) and rises as converter moves towards rectification (e). Total time for reversal, 5·85 sec

Fig. 7(c). Traces obtained with mill in four-high arrangement. Control sequence, off-to-speed four, speed four to speed four, i.e., 0 to 62·5 r.p.m., 62·5 r.p.m. to 62·5 r.p.m. in reverse direction. Note that from (a) to (b) the drive is in current limit. Total time for reversal is 4·85 sec

to DMA is disconnected; it is reconnected in the reverse sense when a polarised relay has operated, indicating that weak field has been reached in the opposite direction. At this point the holding device is disconnected, and the RMA output allowed to ramp up, thereby bringing the converter out of inversion until its voltage is less than that of the motor. The motor then passes regenerative current until it reaches zero speed, and from then onwards takes a motoring current to continue accelerating in the same direction.

For the drive to run above base speed the controller is moved to give this required speed reference, and when trying to get to this speed the system allows the converter volts to go above the normal base speed working value. The motor speed and consequently the motor e.m.f. follow this increase and when the motor e.m.f. rises above the normal base speed value, then from the bridge circuit (of which the motor is one-half) a signal is obtained which overcomes a bias and feeds a field weakening signal into MMA. For 4% above normal motor back e.m.f. a signal is obtained which produces enough field weakening to permit the motor to run at 90 r.p.m. A useful feature of this circuit is that when the motor decelerates on taking load, the e.m.f. drops and field strengthening occurs. The field weakening circuit attempts to keep the motor e.m.f. at a certain value and weakens the field of the motor so that the speed rises to the required value.

When the motor is running at top speed in the two-high condition and the field reference, which calls for full field, is reversed, then the motor e.m.f. is reversed and the field control is trying to produce full field. If this was allowed to happen then the motor e.m.f. would rise to 90/35 times its normal value. To prevent this, the e.m.f. limiting circuit (field weakening circuit) must catch this rise and hold the e.m.f. to its normal value. In order to do this, some anticipation is required. This is obtained by feeding signals proportional to MCE and ME voltage rates of rise into the e.m.f. limiting circuit. However, this means decreasing the rate at which the motor field can be weakened.

Test Results

The traces shown in Fig. 7 are those obtained on site. On each set there are six traces which show (from top to bottom): Reference from the mill pulpit controller; RMA output; motor volts; motor speed; motor field current; motor current.

The conditions under which the traces were taken are noted in the captions.

The following points should be noticed in Fig. 7(a):

The RMA output drops quickly to the hold position (a), remains held until the polarised relay has picked up at (b) and then continues to ramp up when the field relay operates.

The motor field changes from full field in one direction to full in the other in 0·7 sec.

The current does not reach current limit value but tends to have a "tail" on it due to the flattening out of the converter characteristic at top volts, see Fig. 8.

Total time of reversal is 2·7 sec, this time being composed as follows:

Time to hold	0·15 sec
Time to switch	0·20 sec
Time to reverse field	0·50 sec
Time to ramp forward to motor e.m.f. ...	0·35 sec
Time to reverse motor speed	1·50 sec
Total	2·70 sec

In Fig. 7(b), the outstanding features are as follows:

The motor field current overshoots the weak field value appreciably when the field is reversed (a) but the flux lags

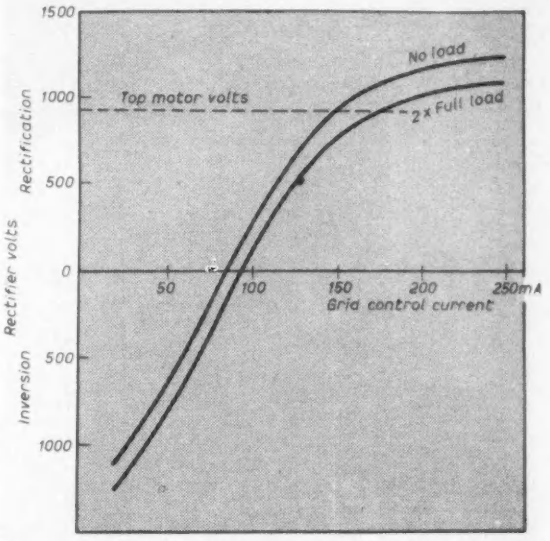


Fig. 8. Flattening of converter characteristics at top volts, which produces the current characteristic seen in Fig. 7(a)

the field due to eddy current effects and, as can be seen from the motor voltage trace, there is no actual overshoot in motor e.m.f. The motor frame is laminated in an effort to reduce the effect of the eddy currents.

The behaviour of the field flux is to reverse to weak value and gradually increase to full as the drive slows to base speed (b). It remains at its full value until the drive reaches base speed in the opposite direction (c). It then weakens to give the required top speed.

Motor current is held at a low value when the drive is at full inversion (d) and rises as the converter moves to rectification (e), and the rest of the reversal is completed out of current limit.

Total reversal time is 5·85 sec, composed as follows:

To hold	0·15 sec
To switch	0·20 sec
To reverse field	0·70 sec
To ramp forward	0·20 sec
To reach base in reverse direction	2·60 sec
To field weaken to top	2·00 sec
Total	5·85 sec

In Fig. 7(c) the points to notice are:

The current limit variation between inversion and rectification is not sufficient to produce any appreciable current rise, and the drive goes straight into current limit (a to b) which was in this case set low at 1·36 times f.l.c. owing to the characteristics of the mill. The drive remains in current limit until the converter comes on to the knee of its characteristic at which time the rate of acceleration drops.

Total reversal time is 4·85 sec composed as follows:

To hold	0·15 sec
To switch	0·20 sec
To reverse field	0·50 sec
To ramp forward	0·50 sec
To reverse	3·50 sec
Total	4·85 sec

Comparing Figs. 7(b) and 7(c), field reversal is slower in (b) because the anticipation on the e.m.f. limiting circuit naturally damps the response.

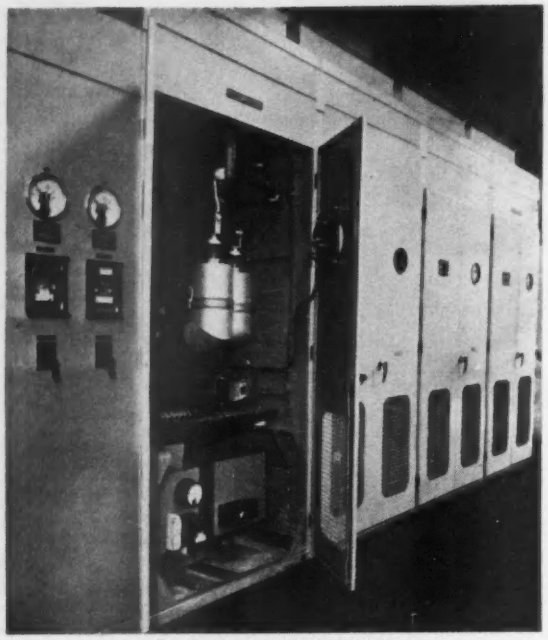


Fig. 9. Converter in its cubicle

The longer time to ramp forward in case (c) was due to the fact that the motor was not running at top volts, and the converter had to come further out of inversion before reaching the motor back e.m.f.

Future Developments

This was the first field-reversing converter-fed mill drive designed by the English Electric Company. It has given very reliable and satisfactory service and performance. In the three years since the designs were completed, further developments have taken place which will allow various improvements to be incorporated in future drives.

First, the control of the motor field by converters will give higher speeds of field reversal and field weakening. A field reversal time of approximately 0·5 sec is expected.

Secondly, the delay which occurs between initial movement of the controller and the switching of the field can be substantially reduced by using solid-state switching devices. Thus, the 0·35 sec taken to start switching will be reduced by a substantial amount.

Finally, instead of using magnetic amplifiers for control purposes and magnetic cores for producing the grid impulses, transistor amplifiers will be used. Their advantages are:

(a) A linear relationship between input to the grid control unit and the converter volts will be obtainable. It has been seen from the traces of the behaviour of the drive when running near top volts that with the change in gain at this point consequent on the converter characteristics, the drive does not continue to accelerate at the maximum rate. The linear control should reduce the time to reverse the motor speed, e.g., in the two-high case (Fig. 7(a) points c to d) the time will be 0·8 sec.

(b) The current limit signal has to pass through two magnetic amplifiers and the grid control unit before it has any effect on the converter voltage and, although the time delay involved in this process is not serious under accelerating and normal rolling conditions, it is of some consequence when the mill is accidentally overloaded. There is always breaker protection against this occurrence, but when transistor amplifiers are used they will be sufficiently fast to catch any extraordinary shock loading on the motor without the breaker operating, and without the additional loss of rolling time in reclosing the breaker.

(c) When transistor amplifiers are used the impedance of the input circuits will be high, and it will be easier to stabilise the control system by using phase-advance methods rather than by having to, in effect, slow the response of the system down by putting in stabilising feedbacks.

Acknowledgment. The author wishes to thank the English Electric Company for permission to publish this article.

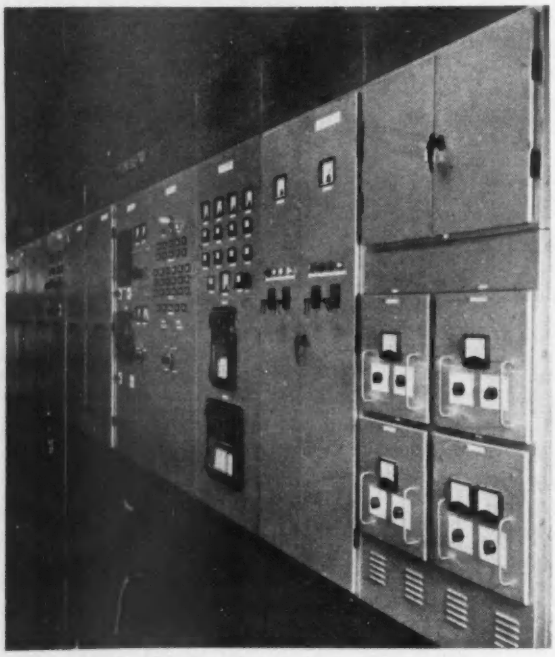


Fig. 10. Control panels for the converter drive

TRANSFORMER CALCULATIONS

CALCULATIONS of the axial short-circuit forces exerted on the turns of a transformer winding is a complex process. One of the difficulties arises when tappings have to be considered. A turn of a helical winding can push its neighbour physically, but cannot pull it.

Since the direction of magnetic force may vary along the stack of coils, changing several times, it is difficult to locate just where on a section of winding physical thrust is applied.

In a newly published ERA report (Q/T151), Mr R. P. Vein shows that there are some points in a winding across which summations of force cannot be made without careful investigation. He derives a method of calculation which avoids these points, with considerable simplification in the calculation process.

The report includes a survey of the methods available for determining the force densities in a given case. The general method of solution is outlined for the general case.

The report is entitled "A method based on Maxwell's equations for calculating the axial short-circuit forces in the concentric windings of an idealised transformer."

Air-blast c.b. for 650 kV

UNUSUAL DESIGN FEATURES

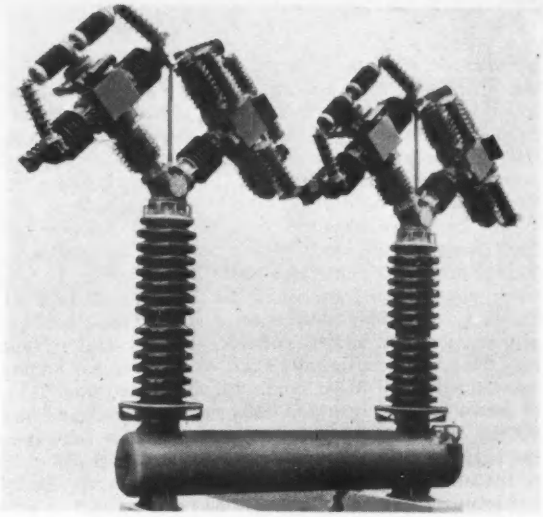


Fig. 1. Type "r" a-b. c-b. with eight interrupters in "Y" formation suitable for 400 kV, 25,000 MVA

CIRCUIT-BREAKERS to meet the onerous conditions required for operation at 400 kV on the CEGB's closely interconnected system were announced recently by English Electric. Reference was made in the CEGB's last annual report to development work in progress on breakers suitable for 400 kV, 2 kA or 4 kA and 35,000 MVA—ratings higher than so far developed by any manufacturer in the world.

Four years ago, English Electric began development work on the new range of air-blast breakers suitable for system voltages from 132 kV to 650 kV and possibly higher, for current ratings of 2 kA and 4 kA and with short-circuit ratings up to 50/60 kA. A short interruption time of 0·05 sec, or 2½ cycles, is claimed for the new range, which compares favourably with the 4½ cycles probably attained with earlier types of air-blast c.b. if they had been developed to be suitable for operating at 400 kV.

Orders for 13 of the new frame "r" circuit-breakers have been placed with English Electric by the CEGB. These will be installed at the 2,000 MW coal-fired station to be constructed at West Burton.

Stafford Symposium

Operational and design features of the new range of air-blast circuit-breakers were the subject of a symposium held recently at the company's Stafford works and attended by British and overseas engineers. Some information was also given at the symposium on research techniques used in developing the range "r" breaker and recent additions to the test facilities.

The type "r" breaker utilises, but in a more fully developed form, the unit construction used on earlier designs of air-blast c.b. Interrupters can be arranged either in "Y" or "T" formation; in "Y" with four interrupters/support column or in "T" with two interrupters/column. Typically, an eight-interrupter breaker in "Y" would be suitable for 400 kV, 25,000 MVA.

A fundamental departure in the interrupter construction is that they are now subjected to full air pressure in both open and closed positions. This is claimed to have several advantages. The blast valve is mounted downstream of the interrupters, actually above them, instead of at the bottom of the support insulator. In consequence, air at 300 lb/sq in. is immediately available when the blast valve is tripped without having to travel up a blast tube. This is one important factor in obtaining reduced operating time and ensuring that interrupters on different phases open together.

With the blast valve at line voltage, a suitable method of remote operation had to be developed. Pneumatic and hydraulic systems were considered, but the solution chosen was to use a trip mechanism of the type well tried on oil-circuit-breakers, linked through an epoxy-resin-bonded glass-fibre rod to the blast valve operating gear at line potential. Compensation is provided for lost motion and the glass-fibre rod, operating with a safety factor of ten, is maintained under tension for both opening and closing movements.

The interrupters are locked in open and closed positions by a toggle mechanism and, since full air pressure is maintained between contacts when they are separated, no isolator is required in the breaker assembly as was necessary with some earlier types of air-blast circuit-breakers.

Epoxy-resin-bonded glass-fibre is also used for the chamber in which the interrupter heads operate and for the air supply pipe mounted inside the porcelain support insulators. The porcelain support insulator is then not subject to bursting stress by internal air pressure and it can also be maintained in compression by tensioning the internal glass-fibre tube. The operating linkage is housed in the annular space between the internal tube and the porcelain bushing and through which dry air, slightly above

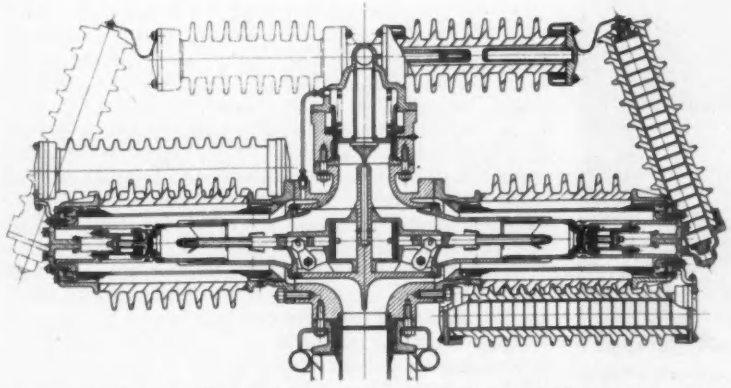


Fig. 2. Sectional view of the type "r" a-b. c-b. showing arrangement of interrupters, position of the blast valve and the voltage equalising capacitors and resistors

atmospheric pressure, is passed continuously. Operation of the interrupter main contacts is shown diagrammatically in Fig. 4. The main current-carrying contacts consist of a fixed sleeve A, with spring-loaded fingers engaging with the movable throat C. Inside A is a spring-loaded piston B with an arcing tip F. The throat C also contains an arcing tip H positioned aerodynamically to give optimum air flow for arc extinction when the contacts part. If, with the contacts closed, the trip mechanism is operated, the mechanical linkage actuates a pilot valve which in turn opens the blast valve, releasing air from behind the operating piston E and throat C. The main contacts on A and C part, but initially contacts B, C and H accelerate together until at about half the contact movement, when the velocity has attained approximately 10 ft/sec, contact B is arrested and an arc is drawn between B and C, then rapidly transferred to H by the inflowing air blast. With the contacts fully open, the toggle J locks their position and the blast valve closes so that the chamber is restored to full air pressure. Dielectric recovery of the gap is said to be rapid enough to avoid restrike under the worst conditions of line dropping. The air pressure also ensures that when the contacts subsequently close, pre-arcing time is very short. Closure is effected by exhausting air from the front of piston E.

Parting the contacts near their maximum velocity gives high-speed break and arcing time is said to be only one or two half-cycles. The main contacts A and C utilise magnetic pinch effect of the current to give high contact pressure.

Resistor Units

Pilot valves for operating the main blast valve are housed in the centre casting of the interrupter head. Capacitors are fitted in parallel with the interrupters to equalise voltage distribution across series heads when the contacts are open. Also in parallel with the main interrupters are resistor units, incorporating a current interrupter, which improve voltage waveforms produced when interrupting with the main contacts. Two types of resistors can be fitted, a heavy duty type suitable for interrupting short line faults or a light duty version to damp out overvoltages when the breaker is switching light inductive currents. Performance of the interrupter is said to be so good that heavy duty resistors are only necessary for the most severe short-circuit levels. It is then not necessary to apply full critical damping to the line side transient to bring the rate-of-rise-of-restriking voltage within the capability of the interrupters.

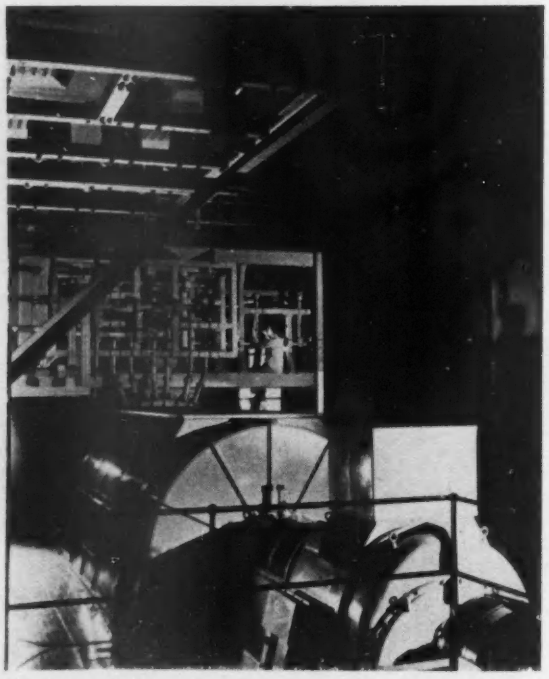


Fig. 3. Part of the new heavy current test installation at the English Electric Stafford works showing one of the two test alternators, now being installed, and the linking busbars

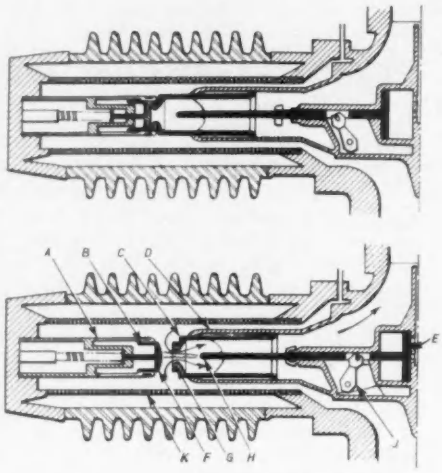


Fig. 4. Diagram of the interrupter heads: above, contacts closed; below, contacts open. A, fixed sleeve main contact; B, piston contact; C, moving sleeve main contact; D, fixed body; E, operating piston; F, arcing contact; G, main arcing tip; H, final arcing tip; J, toggle; K, pressure chamber

The new breaker has only five basic parts: interrupter unit, support column, air receiver, "Y" connector and mechanism. It can be mounted on a low concrete plinth to give minimum overall height. One advantage of dispensing with the isolator or load switch is reduced wear on the contacts. A load switch operating at atmospheric pressure would draw a 6 in. arc at 275 kV as the contacts closed whereas, on the type "r," arcing only occurs in the last $\frac{1}{16}$ in. of movement.

Test and Development

The research programme for the type "r" involved a good deal of investigation into behaviour of arc and air flow in nozzles. Perspex models were built to study the operation, using Schlieren photography and high-speed cameras. Plots of air pressure in the nozzle region, using capacitor transducers, were obtained and the electrolytic tank was used to investigate potential distribution.

In the test department, an artificial line is under construction for investigating high-power faults and two machines, one already installed and another to be installed shortly, will enable existing short-circuit testing capacity to be doubled. The new plant consists of two alternators with separately driven exciters. Each exciter set comprises two d.c. machines in series, flywheel and a drive motor. They are capable of giving approximately 15 kA at 1,500 V d.c. This will give field forcing of six or seven times on the test alternators. Resistors are provided for output current control from the alternators and a back-up a.b.c.b. is rated 70 kA at 11 kV. Air-cored, cast-in-resin reactors and p.f. control resistors precede the fault-applying circuit-breakers which operate in compressed air. These breakers apply the test current through transformers, giving up to 460 kV on the secondary side. The current-applying breakers can be closed at any part of the current cycle.

Readers Views

Correspondents writing under pseudonyms are asked to submit their names and addresses in confidence to the Editor

Adequate Wiring

I WAS most interested to read the paragraph "Who said adequate wiring?" in the 21 September issue (page 433). The price quoted (£30 for wiring a house) seems to suggest that only bare necessities are included, or else that the proportion of trainees to journeymen is out of balance.

I would like to add my own small dig at the question of adequate wiring. I have on several occasions been called upon to tender for wiring done on farm improvement schemes. The successful firm frequently seems to have no knowledge of CP 325 and very little of the IEE Regulations. Grouped switching is rare, two-way control rare, intermediate control unheard of, and batten holders abound in piggeries and elsewhere. The usual lighting fitting in the barn is a plain pendant, where the shattering of a lamp over hay and straw could be a serious fire risk.

Surely this work should be inspected at construction time by a qualified consultant? Incidentally, do not blame the farmers who, I am sure, would pay the extra cost of a good job if they were advised by a responsible body before putting the work to tender.

The NICEIC could do much to improve standards and, with their insistence on fitting notices of periodic inspection, may catch some installations at the time when Form B is sent to the client. Who else? Perhaps my fellow-readers could enlighten me. An article in the farming journals might help but, if we in contracting submitted it, we might be accused of feathering our own nests.

E. J. A. Francis,
BRATTON FLEMING,
NORTH DEVON.

Current-balance E.L.C.B's

WITH reference to Mr Marryat's comments upon my letter published in your issue of 14 September, may it be pointed out that as both the voltage-operated and the current-balance types of e.l.c.b. have their particular advantages in prescribed circumstances. My letter did not intend to indicate superiority for either, but was written merely to draw attention to the fact that a current-balance e.l.c.b. of normal design will in all probability require a lower earth electrode resistance value than a voltage-operated e.l.c.b. of normal design, in order to ensure operation and voltage to earth prescribed by IEE Reg 406 Note (1). It was written in view of the original suggestion which was, presumably, an indication that current-balance e.l.c.b's could possibly substitute for voltage-operated e.l.c.b's.

As stated, current-balance e.l.c.b's operating on 0·25 A fault current are available, usually embodying rectifiers and sensitive d.c. relays, and hence probably quite outside the price range of the average voltage-operated e.l.c.b. so widely used in areas having earthing difficulties.

Concerning the development of the French current-balance e.l.c.b., it is, of course, quite possible by means of readily available amplifying devices to produce an extremely sensitive e.l.c.b. but at, it is suggested, high cost, complication and lack of ability to withstand commercial usage. Further, such sensitivity, even if obtainable, would cause considerable inconvenience due to the high probability of fortuitous operation on small normal leakage currents (hotplates, cooker units, etc.) and possibly in some installations capacity currents.

C. H. Nicholson, M.I.E.E.
HULL.

* * *

I WELCOME the comments of Mr J. A. Robbins, who has expert knowledge of circuit-breaker design. We must certainly keep a sense of proportion as regards the desired degree of sensitivity, but there is a world of difference between the French idea of a 30 A breaker tripping at 25 mA leakage current and our own IEE Regulations which merely require a maximum tripping current of 5 A.

Mr Robbins suggests that a reliable current-balance e.l.c.b. having a sensitivity of 1 A could well be a practical engineering proposition, though it might be more expensive than the existing voltage-operated trips. Cost in these days is very much a function of quantity, and if such a current-balance e.l.c.b. would give better and more comprehensive protection to the consumer, as I feel sure it would, it is likely that a good demand could be achieved. After all, it is the installed cost that finally matters, and it is often an expensive matter to install a supplementary earth electrode *outside* the resistance area of the main earth, and this cost is eliminated where current-balance trips are used. Add to this the advantage of sensitivity to leakage from neutral conductors and discrimination against faults in other circuits (or other flats in a multi-occupier building) and the balance of argument is easily tipped.

Is it not time that manufacturers and other interested parties got together to decide on the all-important question of the desirable level of sensitivity, so that design, development, manufacture and installation could proceed?

R. A. Marryat, B.SC.(ENG), M.I.E.E.
LONDON E.C.1.

Brush Mounting and Machine Adjustment

THE pilot brush method of brush potential measurement is not in such common use as Mr Feaver's letter (5 October) would infer. In my experience of two large manufacturers it was not used at all. For general purpose production testing, the test is carried out by measuring the potential between the brush pigtail and, say, three points on the commutator along the brush arc, as indicated in Fig. 4 of my article. Even companies that use the pilot method do so only in special cases, such as when commutation difficulty is experienced.

The brush pressure measurement depends, of course, on the type of brush holder. For trigger-type brush holders, the method described by Mr Feaver is perhaps the more precise, although I would still suggest that the paper should be placed between the brush and the commutator.

In determining the neutral position, the circumferential stagger of the brushes should, of course, be taken into account. This point was covered in my article published in the ELECTRICAL TIMES of 17 January, 1957.

I would like to take this opportunity of adding to my remarks on compole strength in some high-speed machines. The main cause of the increase in strength being necessary is the flow of eddy currents in the armature conductors of such machines, with skin effect and a change in the reactance of the windings.

S. Johnson,
BEDFORD.

Water Heating

THE fact that the test on the SWEB immersion heater installation referred to by Mr McIlwrick showed a heat loss of 21 units/week does not mean of course that this would be the loss under ordinary working conditions. Obviously, there would be some occasions when the storage cylinder would contain nothing but cold water, and until the whole of the cylinder was heated up to its maximum temperature the rate of heat loss for a time would be much lower than the 125 W/hr average.

In my own installation the fact that the cylinder is only partly heated (by the top immersion heater) for a considerable part of each day does play some part in reducing heat losses.

Nevertheless, the point I wanted to make is that if the cylinder is reasonably well lagged the loss of heat by radiation under normal working conditions is such that it is not worth while switching the immersion heater off during the night. In my case the only switching I do is to select which heater I want to use. The benefits I obtain are: first, that there is always a supply of hot water available of at least eight gallons at 140°F; and secondly, that the top heater gives me a quick recovery of a small quantity of water after, say, two baths have been taken.

As regards the temperature rise of the water in the cistern, it is the water authority who is concerned and not me. The fact that some of the heat losses are recovered by transference to the feed water is, to my mind, rather attractive as long as the warmth of the water in the cistern does not of course lead to "waste, undue consumption, misuse or contamination of the water" as the regulations have it.

P. Honey, A.M.I.E.E.
LONDON W.C.2.

U.S. Transmission Plans

A VAST plan for the interconnection of American utility companies' systems was outlined recently by Mr P. A. Fleger, president of the Edison Electric Institute, the organisation which co-ordinates activities of the US light and power companies.

An outline of the plan was published in the September issue of the *Edison Electrical Institute Bulletin* and it states that the investor-owned utility companies plan to spend approximately $8 billion (£2,860 million) for new electrical power transmission facilities by 1970.

Since the end of World War II, use of electricity in the US has been growing at the rate of 8·6% a year. This is about 2½ times the rate of growth of the entire economy. More than three-quarters of the power plant capacity in the USA is provided by about 400 investor-owned companies and they have, until recently, been spending about $3·2 billion (£1,140 million) each year for new plant and equipment. This will increase to $3·5 billion this year.

Load Will Double by 1970

By 1970 it is anticipated that the peak load of all the electric companies will reach 226,500 MW and, to meet this demand, 136,000 MW of new plant will be required over the next ten years. This is more than the total generating capacity at the end of 1960. The implication is that generating capacity will double by 1970, while long-term estimates indicate that by 1980 the peak load will have risen to 428,500 MW, requiring a further doubling of capacity.

By 1970 the total investment in electrical plant is estimated to be $88 billion, or nearly twice the investment in 1960. Expenditure for new construction will be at the estimated rate of $6·4 billion (£2,290 million) p.a. by 1970 and $12 billion by 1980, with about half the investment obtained internally and the balance by new money.

The plans for transmission provide for operation on an interconnected basis of all the major power systems of the USA. Although official estimates of the lengths of line required have not been given, it is thought that more than 100,000 miles of line for all voltages will be built. Transmission voltages up to 460 kV are now in service in the USA, and the length of line at the end of 1959, 364,000 miles, was double that in 1940.

Nearly all power systems east of the Rockies are already connected and those to the west of the Rockies have been interconnected for several years. By 1970, all power systems should be operating interconnected.

The idea of pooling generating capacity is not, of course, new to the utilities. Nearly all the existing companies have emerged as the result of integration over the years of hundreds of small, isolated systems. In addition, many companies have interconnections, enabling them to pool their generating capacity to give economy in operation.

Some schemes are already under way; for instance, in Texas, four utilities announced in March plans for a 345 kV interconnection for their 6,500 MW of generating plant and, in April, eight mid-western and southern states announced plans for at least 4,000 miles of 345 kV and 230 kV lines. In June, another scheme was announced by three utilities for four major high voltage interconnections costing more than $3 million.

Provision for 500 kV Working

Many of the lines to be constructed will operate at 345 kV, some with provision for conversion at a later date to 500 kV. A 500 kV line is being tested in Colorado, and in Pennsylvania a 460 kV line is operating in the system.

The USA has one-sixteenth of the world population but about one-third of the power-producing capacity, said Mr Fleger, and by 1970 power production/head is estimated to be 7,500 kWh p.a. In comparison, the USSR plans provide for 3,000 kWh/head p.a. in that year. In the USA, power systems have been built up in a simple pattern designed to serve the needs of people in different localities, beginning in the districts and divisions of each company's service area. To try to initiate development of electricity supply at a national level would, Mr Fleger said, mean turning upside down the present system of planning for the supply industry.

AROUND THE TRADE

BY PEREGRIN

THE lovely autumn weather has not, unfortunately, brought in either the refrigerator or the TV customer, except where rental schemes are running; and fire and blanket sales are merely odd spots of interest in a rather dull period, brightened only early in the month by presents for the annual flurry of beat-the-tax weddings . . . light fittings, kettles, mixers and transistor radios seemed to be this year's choice. Outside, however, contracting work is still running to capacity—except, perhaps, where the contractor has allied himself too closely to one type of industry. It does not pay in these days of "little budgets," strikes, lock-outs and to-break or not-to-break tea times to put all one's eggs in one basket; the contractor who wants his wheels to keep turning must be prepared to tackle any and all kinds of electrical work backed by a considerable ability in the mechanical field and in the world of electronics. And, strangely enough, while the possession of a well-stocked and attractive showroom may attract repairs and odd jobs to the contracting department, it seems to repel the inquiries for the heavier and, often, more lucrative work. The sale of dainty fittings and pop-up toasters seems to cloud the issue and local manufacturers appear more impressed by a scrubby little office, attached to an equally scrubby little workshop and yard, than by a well laid-out showroom staffed by gorgeous blondes—unless one can include a man's corner with gadgets (drills, grinders, motors, heavy switchgear, etc.). I have found from my own experience that if I can keep my corner window looking like the storeroom to the workshop—but, withal, a well-polished storeroom—that it overcomes the feeling that I and my staff are only capable of selling muffin dishes to milady. The only other alternative is a separate address. Nevertheless, retailing is still a worth-while investment, and the two departments running discreetly side by side can help one another's profits considerably.

Protecting Shoppers

I see from the "dailies" that the Labour Party are urging the appointment of new watchdog committees to safeguard shoppers from shoddy goods, misleading advertising and sharp practice by h.p. salesmen, with, top of the list, a Consumers' Council. As a genuine trader I am all for consumer protection, but I thought that the Consumers' Council already attached to the British Standards Institution were doing just that thing, and doing it very well. Not only do they issue *Shoppers' Guide* six times a year, they also take up customers' complaints with manufacturers, give sound advice when asked on quality and fitness for purpose, and lecture to organisations, Women's Institutes and the like. Incidentally, they do not advertise any particular make of product but, if you are a good trader and announce that all your stock carries the BSI symbol of high standard, the Kite Mark, your good deeds will be registered for all to read in their *Shoppers' Guide* and doubtless mentioned in all their lectures. Boots Chemists were clever enough to cash in on this one on electric blankets and, apparently, get a free puff at all meetings as well as honourable mention in the *Guide*. Unfortunately, I shall not be able to qualify for this honour as my favourite bedwarmer is the Thermalux mattress overlay—a type for which the BSI appear to have no standards laid down, but which I consider the most comfortable method of producing night-time warmth in safety. If it has a fault it is the absence of a temperature regulator to enable one to sleep with the heat on, as desired, by some of my older customers.

Advertising

But, talking of advertising, what a spate of expensive newspaper adverts have been appearing while trade lies dormant and 1960 goods still choke the manufacturers' stores and clutter up the shelves of wholesalers and retailers. I hope it is as effective at it deserves to be, but I wish the several firms making under-floor heating would get together with the fire and convector manufacturers and deliver a counterblast to the oil heating advertisements. The full-page advert which has lately appeared in the "dailies" with an attractive design reminiscent of Strube's Little Man, some telling arguments, and all the usual gimmicks—expert advice for the asking, etc.—is bound to impress many readers looking for an answer to their heating problems. I can never understand why there is so little joint advertising among manufacturers. I can imagine the impact on our women folk of a joint advert in one of the glossy magazines—page after page of heating in glowing colours. Incidentally, I noticed one advert on heating beautifully illustrated and extolling the virtues of a coal fire. In the blurb it was described as giving out the heat of a 3 kW fire and equal to a 3½ kW immersion heater with the back boiler—6½ kW of heat from one fire? Multiply it by the B.Th.U's and turn this into pounds of coal and it is sure some fire! But it is interesting that coal-fire manufacturers now measure the output of their grates by electric heating standards. Our power is evidently recognised!

I notice that *Shoppers' Guide* 22 deals with the functions of the Electricity Consultative Council and pinpoints how little has been achieved in certain districts according to the committee reports. I feel that the public does not generally know that such a body exists for their assistance in electricity service problems. What about the boards enclosing a printed slip with their bills: "If you have any complaints to make of our service why not write to your local Consultative Committee?" There is a chance that it might bring in a spate of the usual trivialities—I only pay my bills once a year, etc.; I blew a fuse last Thursday, and so on, but somewhere it might achieve a greater service than it does at present and make the time spent by the voluntary members more worth while. I liked also the notes in the *Guide, on* "How hot is warm?" I am quite sure that the traders would appreciate a standard marking and temperature range on washing machines and irons both for selling and repairing purposes, and if every manufacturer followed the same plan of marking and tied it up with appropriate records in their instruction books, the housewives would soon show that they are perfectly capable of becoming conversant with thermometer readings and prefer the cut-and-dried to the hit-and-miss approach.

Personalities *in the industry*

Mr K. H. Vere

Mr A. A. Evans

Mr D. W. Maddocks

Mr W. A. Haythornthwaite

Mr J. L. Murphy

Sir Ivan A. R. Stedeford, chairman and managing director of Tube Investments Ltd., has relinquished the managing directorship, but continues as executive chairman. Three new managing directors of the group have been appointed. They are **Sir William Strath,** who was formerly permanent secretary, Ministry of Aviation, until joining the Tube Investments board last January; **Mr W. Hackett** and **Mr R. D. Young.** The latter two have been with TI for nearly all their business careers.

Mr K. H. Vere has been promoted to general sales manager of the Frigidaire Division of General Motors Ltd., in place of **Mr G. E. Worssam** who has held that position since 1950 and is taking on new responsibilities as special assistant to the general manager. Mr Vere, who became executive assistant to the general sales manager last March, joined Frigidaire in 1949 as a sales promotion executive. In 1953 he was promoted to sales promotion and advertising manager, and in 1958 to marketing manager.

Chief financial officer to the CEGB since October, 1957, **Mr J. M. Drummond,** F.S.A.A., F.I.M.T.A., has been appointed financial adviser to the Electricity Council as from 1 Dec. He will succeed in that post **Mr A. M. Scott,** M.C., C.A., who retires on 30 Nov. (*ESH, pages 45, 50). Prior to joining the Electricity Council, Mr Scott had been chief accountant to the Central Electricity Authority since 1951, previous to which he was deputy chief accountant (distribution). From 1936 to 1948 he had been controller of Edmundsons Electricity Corporation Ltd. and its associated companies, and for some years a director of the latter. Mr Drummond was deputy chief accountant to the CEA from 1951 to 1957, and had earlier held local government posts including those of city treasurer of Sheffield and borough treasurer of Darlington. He is an honoursman of the former Society of Incorporated Accountants (now merged with the Institute of Chartered Accountants), and was a member of the Council of the Institute of Municipal Treasurers and Accountants before joining the Electricity Supply Industry.

Previously Swindon regional sales administrator, **Mr A. A. Evans** has now been appointed sales manager of the Capacitors and Resistors Division of the Plessey Co. Ltd., at Swindon. Prior to joining that concern in 1958, he was national sales manager for the Underwood Corporation of America.

The new director of labour and welfare of the North Western Region, CEGB, is **Mr D. W. Maddocks,** B.A.(ADMIN.), A.M.B.I.M., A.M.I.P.M. (*ESH, page 73). He started with the Derby Corporation Electricity Dept. as a junior clerk in 1939 and, after war service in the Fleet Air Arm as a pilot, studied at Manchester University, where he graduated in 1949. He then became assistant district labour relations officer with the then BEA, East Midlands area, a post he held until January, 1960, when he joined the Electricity Council as assistant labour relations officer. He returned to the North West last March as district industrial labour relations officer of the North Western area, a post he has just relinquished.

Hoover Ltd. announced last week that "under important rearrangements of responsibilities with a view to strengthening the operations and competitive position of the company," **Mr Arthur F. Earle** becomes chief resident executive of the company, and directly responsible to Mr H. W. Hoover, jnr, the chairman. Mr Earle, a Canadian, who only joined the British company last July as deputy chairman, had previously been with Aluminium Ltd. for 15 years. The move, seemingly, means demotion for **Mr Sidney Roberts,** who joined Hoover Ltd. in 1929 and has been managing director since February, 1955. But Mr Roberts is to continue in that office while devoting his attention to home and export sales, production and purchasing, and he will be directly responsible to Mr Earle. These changes were announced by the chairman, Mr H. W. Hoover, jnr, on his arrival from the USA last week, when he also again denied recent rumours that the American parent company had been buying up shares in the British firm. But it has been suggested that the "Keymatic" has not been the success the management hoped for, due to the credit squeeze.

Mr W. A. Haythornthwaite, principal assistant (final accounts) in the Essex sub-area of the Eastern Electricity Board, has been appointed accountant for the Board's Suffolk sub-area as from 16 Oct. in succession to **Mr G. W. Ruck** who has moved to Essex (*ESH page 111). Mr Haythornthwaite has held his present post since 1948, and previously served in the treasurers' departments at Finsbury, Plymouth and Willesden.

Previously with GEC, **Mr John L. Murphy,** J.P., A.R.I.N.A., A.I.MAR.E., has joined Atlas Lighting Ltd. as sales supervisor for their Marine Lighting Department. He started his career in the marine industry in 1921 as a pupil of naval architecture with W. Esplen Son and Swainston Ltd. He joined the Marine Department of GEC in 1931, since when he has specialised in handling the lighting equipment for all classes of ships. With Atlas he will be responsible for the sale of lamps and lighting equipment for marine purposes throughout Great Britain.

From London Transport we learn that **Mr G. R. Kent,** A.M.I.E.E., M.I.R.S.E., recently became a principal executive assistant in the department of the chief

**Denotes revision to the "Electricity Supply Handbook, 1961."*

signals engineer, with the title of maintenance engineer (signalling), and **Mr M. H. Wheat,** A.M.I.E.E., M.I.R.E., has been promoted to a principal executive assistant in that department with the designation of design engineer (signalling).

The Minister of Power has appointed **Mr C. T. Melling,** C.B.E., M.SC.(TECH.), M.I.E.E., M.I.MECH.E., M.INST.F., F.B.I.M., to be a member of his Advisory Council on Research and Development, in succession to **Sir Josiah Eccles,** C.B.E., M.M., D.SC., M.I.C.E., M.I.E.E., M.I.MECH.E., who has retired from the position as a deputy chairman of the Electricity Council.

Mr E. Bolton King will retire from the posts of assistant controller, Arts and Science Division (Science group), and director, Science Department of the British Council at the end of this year, prior to taking up the position of British Council science officer in Chile. His successor as assistant controller, Arts and Science Division, will be **Dr P. A. I. Tahourdin,** O.B.E., and **Mr F. M. Beatty,** M.B.E., will become director of the Science Department in April next.

Sir Eric Mieville is to retire from the chairmanship of Dewrance and Co. Ltd. on 31 Dec., 1961. The present deputy chairman, **Sir Donald Perrott,** will then succeed him as chairman. **Sir Francis Evans** is also retiring from the board. It is also announced that **Mr J. B. W. Cunningham,** at present managing director of the Engineering Group of the UK Atomic Energy Authority, is joining Dewrance and Co., and will take up duties as managing director towards the end of January.

Chief engineer of the South of Scotland Electricity Board for the past six years, **Mr John Henderson,** C.B.E., M.C., B.SC., A.R.T.C., M.I.E.E., officially retired last week-end, and to mark the occasion a dinner was given in his honour a few days earlier (Mr Henderson's successor has not yet been named) (*ESH, page 163). During his period as chief engineer many notable engineering achievements have taken place in the Board's area—the Kincardine station with its 120 MW sets started operating; the Barony station burning coal slurry was commissioned in 1957; construction of Hunterston nuclear station has steadily progressed and work has started on building the 275 kV supergrid system there. He has also seen the percentage of farms connected raised to 93% and the supply voltage standardised throughout the district. Mr Henderson has also presented numerous technical papers at international as well as national conferences, including three at the World Power Conference and two at the BEPC (jointly with another author). He started his career in the industry with the Glasgow Corporation undertaking, but in 1924 joined the Edinburgh undertaking as technical engineer, a position he held until 1928. There followed a period of 16 years in the same capacity with the CEB in Scotland, and in 1944 he joined the Ayrshire Electricity Board as deputy engineer and manager. With the formation of the South West Scotland Electricity Board in 1948 he became its chief engineer, continuing in a similar capacity with the South of Scotland Board from 1955.

Thorn Electrical Industries Ltd. announce the appointment of five executive directors—**Mr J. G. Christopher,** T.D., F.I.E.S., M.S.M.A., **Mr V. Coffee, Mr A. J. Ford, Mr D. A. Neill** and **Mr G. J. Strowger.** All are senior executives and directors of subsidiary companies, and together with the present board will be responsible for the management and direction of the company's affairs.

Matthews and Yates Ltd. have appointed four new assistant directors—**Mr L. Barton,** A.M.I.H.V.E., **Mr A. B. Crompton,** A.M.I.H.V.E., **Mr G. L. Jaques,** A.M.I.MECH.E., A.M.I.H.V.E., and **Mr L. Winstanley,** A.M.I.MECH.E., A.M.I.H.V.E., all of whom have been with the company for a number of years. Messrs Barton, Crompton and Winstanley are engineering executives at the Manchester head office, and Mr Jaques is employed in a similar capacity with the London office.

Newly appointed director of AEI Research Laboratory, Manchester, **Dr J. M. Dodds,** O.B.E., M.A., B.SC., to whom we briefly referred last week, graduated at Aberdeen University and, on completion of a graduate apprenticeship with Metropolitan-Vickers in 1931, was awarded a travelling scholarship to Aachen University, where he gained the degree of Dr.Ing. He joined the Radio Section of the Metrovick Co.'s Research Laboratory at Manchester in 1933 as a physicist. In 1937 he became responsible for the development of C.H. radar transmitters, and his work on radar devices continued until 1945, for which he was awarded the O.B.E. He later became group leader in charge of the work of the mechanical, metallurgical, physical metallurgy, radio and process laboratories and, in 1956, was appointed assistant manager of the Research Laboratory, being promoted to manager in 1957. There, he takes over from **Sir Willis Jackson,** who has also just completed a three-year term on the DSIR Research Council.

Group commercial executive of the Plessey Co. Ltd., **Mr R. L. Higgin,** A.M.I.E.E., has now been appointed general manager, Components Group.

Mr F. E. Bonner, B.SC.(ECON.), D.P.A., F.S.A.A., A.I.M.T.A., has been appointed an additional deputy chief financial officer to the CEGB (*ESH, page 50). Since January, 1958, he has been an assistant chief financial officer concerned with the financial aspects of the Board's capital programmes, including nuclear power and budgetary control, for which he continues to be responsible.

The English Electric Co. Ltd. has made the following changes on the boards of its subsidiary companies: **Mr G. Nelson** has been appointed chairman of Marconi's Wireless Telegraph Co. Ltd. He succeeds **Lord Nelson of Stafford** who remains a director of the company. **Sir Gordon Radley** has been appointed deputy chairman. Sir Gordon has also been appointed chairman of Marconi Instruments Ltd., succeeding Lord Nelson, and **Mr F. N. Sutherland,** C.B.E., M.A., M.I.E.E., has been appointed deputy chairman. **Lord Nelson, Mr G. Nelson** and **Mr P. Horsfall** retire from the board. **Dr E. Eastwood,** PH.D., M.SC., M.I.E.E., has been elected a director. Sir Gordon has been appointed chairman of English Electric Valve Co., succeeding Lord Nelson, and **Mr P. L. de Lazzlo** has been appointed deputy chairman. Lord Nelson, Mr G. Nelson and Mr Horsfall retire from the board of that concern.

Recently retired from the position of chief engineer to the London Electricity Board, **Mr L. H. Welch,** O.B.E., B.SC.(ENG.), M.I.E.E., has been appointed industrial relations consultant with the Electrical Research Association. Mr Welch has been closely connected with the work of the ERA for many years, especially in connection with cables and insulating oils. He was a member of many of the

Mr J. Henderson

Dr J. M. Dodds

Mr R. L. Higgin

Mr G. F. Slade

Mr Arthur Bond

Mr J. M. Hodge

Mr J. E. L. Robinson

former committees on this subject and chairman of a panel responsible for urgent work on the utilisation of power cables. He remained chairman of the new research advisory committee which took over this work, and he is also a member of Divisional Committee No. 1 on insulating materials, and of the research advisory committee on insulating oils. In his new appointment, Mr Welch will be acting as advocate for co-operative research in the electrical industry. He will strengthen co-operation between the ERA and its larger members, assist in the practical planning of research, and help to ensure that those researches are pertinent to industry's problems.

We reported last week the appointment of **Mr G. F. Slade,** B.SC., M.I.E.E., as the new deputy chief engineer of the Midlands Electricity Board as from 1 Nov., and we are now able to reproduce, above, his portrait. Mr Slade, who has been assistant chief engineer (distribution) to the Board since 1954, has also served on a number of Electricity Boards' committees concerned with switchgear and transformers, and also on electrical committees of the BSI.

The Marconi International Marine Communication Co. announce that **Lord Nelson of Stafford,** LL.D., F.C.G.I., HON. D.I.C., M.I.MECH.E., HON. M.I.E.E., has retired from the board of directors and has been succeeded as chairman by **Sir Gordon Radley,** K.C.B., C.B.E., B.SC., PH.D., M.I.E.E. **Mr G. Nelson,** M.A., M.I.C.E. M.I.E.E., M.I.MECH.E., has relinquished the position of deputy chairman but remains a member of the board. **Mr R. Ferguson,** O.B.E., will retire from the position of managing director at the end of 1961 but will retain his seat on the board. **Mr D. P. Furneaux,** M.A., B.SC., the general manager, has been elected a director and appointed managing director designate. He will take up his duties as managing director on 1 Jan., 1962.

The Illuminating Engineering Society's gold medal has been awarded to **Mr H. C. Weston,** O.B.E., in recognition of his important contributions to lighting from the early 1920's, including his work on all editions of the IES Code. The medal was presented to him on 11 Oct. by the president, Dr W. S. Stiles.

By an unfortunate slip last week, the portraits of **Mr Arthur Bond,** who is to be the new chairman of the Yorkshire Electricity Board, and **Mr J. M. Hodge,** now export manager and London office manager of M and C Switchgear Ltd., were transposed. We now present, above, the two pictures correctly named, and offer our apologies to the gentlemen concerned.

Mr I. M. Colquhoun has been appointed Regional personnel officer for the North Eastern Region of the CEGB. He has had many years' experience with a nationalised industry in the field of personnel matters and negotiations with trade unions (*ESH, page 70).

Mr W. T. Souter, joint managing director of Holophane Ltd., was installed as president of the Illuminating Engineering Society on Tuesday.

Mr L. H. Bedford, C.B.E., M.A., B.SC., F.C.G.I., M.I.E.E., M.B.I.R.E., F.I.R.E., chief engineer of the Guided Weapons Division, English Electric Co., and **Mr G. B. R. Fielden,** M.A., M.I.MECH.E., F.R.S., are among five new members just appointed to the Council for Scientific and Industrial Research.

Mr E. Crisp has been promoted to general sales manager of Aerostyle Ltd., with whom he has served since 1926.

A deputy to the financial adviser to the Electricity Council since the latter's formation, **Mr F. A. Rawlings,** O.B.E., F.R.ECON.S., retired from full-time service with the Council on 30 Sept. (*ESH, page 45). Mr Rawlings joined the Electric Lighting Branch of the Harbours Department of the Board of Trade in 1914, which in those days dealt with the administration of the Electric Lighting Acts. After war service he rejoined the BoT in the Public Utilities Branch, and when the Government undertook the formulation of legislation preparatory to the Electricity (Supply) Act, 1919, he joined the staff of Sir John Snell, electrical adviser to the Government, and worked on questionnaires to all electricity undertakings to produce the first set of national statistics for the industry. With the setting up of the Electricity Commissioners he joined their staff, initially on the engineering and planning staff and then on finance. During the last war he was seconded to the Ministry of Supply, and returned to the Commissioners in February, 1945, as deputy financial officer to assist in connection with impending legislation for the nationalisation of the industry. Later he became chief financial officer to the Commissioners, and on the formation of the British Electricity Authority was appointed as assistant secretary for financial administration. He was later appointed finance officer to the BEA, a position he held till the formation of the Electricity Council, to whom he remains available for consultation.

An executive director of Associated Engineering Ltd. since July, 1958, **Mr J. E. L. Robinson,** M.SC., M.I.E.E., has resigned from that position to take up an appointment with Associated Electrical Industries Ltd., details of which we expect to publish next week. Earlier, Mr Robinson was manager of the Transformer Dept. of Ferranti Ltd. for nine years, following three years as departmental manager there. He was chairman of the IEE Supply Section in 1960-61. Educated at Queen's University, he received early training with Ferranti's where he became a research engineer in the Transformer Dept. in 1931. During the war he served as a major in the RA, and from 1942 was with the Directorates of Artillery and Signals and Radar Development, in which he rose to lieutenant-colonel. After the war he rejoined Ferranti Ltd.

Ultra Electronics Ltd. have formed a new Telecommunications Division, and **Maj-Gen E. S. Cole,** C.B., C.B.E., formerly Director of Telecommunications at the War Office, has joined the company to co-ordinate its telecommunications activities.

Air Commodore F. E. Tyndall has been appointed Director of Electronics Research and Development (Air) at the Ministry of Aviation from 1 Nov., in succession to **Air Commodore A. G. P. Brightmore** whose tour of duty in the department ends on 31 Oct.

Mr J. Waddell, executive director of Turner Brothers Asbestos Co. Ltd., and of Glass Fibres Ltd., has been appointed managing director of each. He continues to be executive director of J. W. Roberts Ltd.

Mr J. W. Sheldon, M.B.I.M., secretary of Gent and Co. Ltd. since April, 1957, has resigned owing to ill health. He joined the company in 1919 and became head of the Cost Office, prior to being appointed chief accountant in 1953.

R. B. Pullin and Co. Ltd. have appointed three new area representatives for their Thermostat Division—**Mr D. S. Crichton** for the Southern area, **Mr P. K. Smith** for the Midlands and South Wales and **Mr D. W. Brown** for the Northern area.

Mr J. R. Pugh, M.A., A.M.I.E.E., has joined Albert E. Reed and Co. Ltd. as manager of the Packaging Division Development Dept. He had been with British Insulated Callender's Cables Ltd. since 1948, and after having supervised original work on development connected with the new a.c. scheme of railway electrification, he was awarded the Sir Alexander Roger award in 1956 to study similar techniques in Europe and Scandinavia. He was subsequently appointed traction engineer to the company. In 1960 Mr Pugh was appointed chief development engineer responsible for the planning, operation and financial control of the Accessories Division development programme, and co-ordination with the BICC group research organisation.

Mr W. S. Perkins, A.C.G.I., A.M.I.E.E., has been appointed Divisional executive (Rugby) of the AEI Transformer Division. He started as an apprentice at the BTH Rugby Works in 1924, being educated at Uppingham School and the City and Guilds Engineering College. On completion of the student apprenticeship course in 1929 he remained in the Transformer Engineering Department until transferring to what was then known as the Contract Department in 1930, serving in the Transformer Section. On the formation, in 1932, of the Transformer Sales Department, Mr Perkins joined that department which, in July, 1959, became known as Transformer Sales Department, AEI Transformer Division. He was appointed manager of that department in June, 1960.

Secretary of the Birmingham area of the Midlands Electricity Board since 1948, **Mr Arthur Webb,** F.C.I.S., is to retire at the end of October after over 40 years' service in the electricity supply industry (*ESH, page 125). Mr Webb was educated at Longton and at Hanley Technical School, and after war service and some years in a family accountancy business he joined the clerical staff of the Stoke-on-Trent Corporation electricity undertaking in 1920. In 1928 he was appointed commercial assistant to the borough electrical engineer and manager at Watford, serving there until 1936, when he became assistant secretary to the Birmingham Corporation Electric Supply Dept., holding that position until 1948. Mr Webb has also been secretary of the No. 4 (Birmingham area) Committee of the Midlands Area Consultative Council since its formation in 1949. A keen photographer, he has accepted an appointment as honorary organiser of the annual Photographic Convention of the UK, which next year will be held at Perth.

Formerly executive director of the Components Division of the Plessey Co. Ltd., **Mr E. H. Twaits** has been appointed general manager of the Electronics Division of Amphenol-Borg Ltd. The latter concern are shortly moving into a new 34,000 sq ft plant at Whitstable.

Organisation and methods officer of Brookhirst Igranic, **Mr D. Fowler,** ASSOCIATE I.E.E., has been appointed works manager of Avo. (Both companies are members of the Metal Industries group.) Mr Fowler was apprenticed with Igranic Electric and had technical sales experience with Brookhirst Igranic in London, Leeds and Manchester before going to Bedford in 1957.

Construction manager for the Lakeview generating station, Toronto, of the Hydro Electric Commission of Ontario for the past three years, **Mr F. J. Dobson** has been chosen as chief executive of Ghana's Volta River Authority.

Mr A. Marcus Neal has resigned from the chairmanship of Peter Brotherhood Ltd. and **Mr W. Thompson,** formerly works manager, has been appointed to succeed him.

KGM Electronics Ltd. have appointed **Mr A. T. Black** as managing director of the company, but he will continue to carry on his interests as a consultant.

Previously station superintendent at Hammersmith power station, **Mr S. R. Parker,** A.M.I.MECH.E., has been appointed boiler house superintendent at Fulham generating station, South Eastern Region, CEGB (*ESH, page 56).

Concerning our note last week on the new appointment of **Mr D. Ambrose** with Fischer and Porter Ltd., we were misinformed regarding his previous position. We now understand that he was manager of the Laboratory Engineering Department of Automatic Control Engineering Ltd.—a subsidiary of Constructors John Brown Ltd.

Mr H. F. Rouse, A.M.I.E.E., A.M.B.I.M., has been appointed district engineer, South Eastern district of the London Electricity Board, in succession to **Mr A. J. Spraggons,** A.M.I.E.E., who has moved to the Southern district (*ESH, page 83).

Mr R. E. Gleadow, A.M.I.E.E., is to rejoin the South Eastern Electricity Board as commercial officer for the Mid-Sussex sub-area. He will succeed **Mr F. Lynn,** A.M.I.E.E., who retires in January, 1962 (*ESH, page 91). For the past six years Mr Gleadow has been with the North Western Electricity Board as district consumers' engineer, Bolton district, and senior assistant commercial engineer in No. 6 sub-area. But from 1951 to 1955 he was district commercial engineer in Seeboard's Tunbridge Wells district.

Mr A. J. Leather, M.I.E.E., A.M.B.I.M., is also to rejoin the South Eastern Electricity Board—as manager of the Central Sussex district, in succession to Mr Arthur Barnes who recently retired through ill-health. For the past three years Mr Leather has been district manager of the South Wales Electricity Board's Merthyr and Aberdare district, but he previously served in Seaboard's Central Sussex district as district engineer from 1956 to 1958 (*ESH, pages 90, 132).

The UK Atomic Energy Authority announce the appointment of **Mr H. V. Disney,** C.B.E., M.I.MECH.E., at present deputy managing director, as managing director of their Engineering Group, to succeed **Mr J. B. W. Cunningham,** M.I.MECH.E., who is leavinig on 20 Jan., 1962, to join Dewrance and Co., as we note on page 529.

Promotions in their sales - service organisation in Scotland are announced by Hoover Ltd. Formerly Scottish branch manager at Glasgow, **Mr A. A. Hutchison** becomes northern divisional manager with headquarters at Leeds, and is succeeded by **Mr J. M. Geeson** from Bristol. The latter's position is taken over by **Mr A. McKay,** formerly Edinburgh district manager, and **Mr W. A. Sinclair** succeeds Mr McKay.

Mr A. C. Main, B.ENG., M.I.MECH.E., M.I.E.E., M.I.P.E., has been appointed a director of manufacturing services to Associated Electrical Industries Ltd.

Elliott Brothers (London) Ltd. announce that **Mr A. C. Jones** has been appointed an assistant general manager within the Automatic Control Valves group.

Among the Ministerial changes announced on Monday, **Mr F. J. Erroll,** formerly Minister of State, Board of Trade, is promoted to President of the Board of Trade.

OBITUARY

Mr J. E. Wright, M.I.E.E., lately of Admiralty Compass Observatory, Slough, died on 6 Oct.

Mr N. E. Francis, works manager of Permanoid Ltd., died on 8 Oct., aged 46. He had served in the electric cable making industry throughout his career, and before joining Permanoid in 1955 was previously with Pirelli-General, Concordia and Mersey Cables Ltd. He was also a director of Permanoid Ltd. and of their associated company, Arrell Electrical Accessories Ltd. He also served on various BSI committees concerned with the revision of cable specifications.

The application engineer

I.E.E. PRESIDENT SAYS HE LINKS POWER AND ELECTRONICS

THE problem of technical manpower for the electrical industry provided a central theme for Mr G. S. C. Lucas, the new president of the IEE, when he delivered his inaugural address last week. The statistics of that manpower over recent years, as Mr Lucas calculates, are shown in Table 1, which of necessity excludes those who become effective technicians without formal qualifications.

Table 1. Electrical Engineering Manpower

Year	Professional	Technician		
		Nat. Cert.	C. and G.E.	Total
1930	8,300	1,960	2,360	4,320
1940	14,250	8,960	9,150	18,110
1950	24,000	22,600	20,000	42,600
1955	30,000	36,500	23,200	59,700
1960	38,000	69,775	25,000	94,775

Mr Lucas considers that the time has come when technicians' qualifications can be recognised as something honourable and worth while in their own right. He hopes that "the existing confusion," as he calls it, caused by using the National Certificate courses for professional requirements, will not continue much longer.

Technical Manpower

From a consideration of British manpower, Mr Lucas moves to that of the USA and USSR. Corresponding US figures for 1960 he estimates at 130,000 and 96,500 for professional engineers and what he calls "non-graduates." He equates the latter to British technicians. The comparison looks better for the UK when presented in terms of engineers/10,000 of population. For the UK, the 1960 figures are 7·2 and 18·0, and for the USA 8·5 and 6·3. USSR figures are available only up to 1954, when they were 54,000 and 97,000 in total, and 2·5 and 4·4 on the population basis. It is the declared Russian intention to have four technicians to support each professional engineer.

Differences in total manpower do not explain the failure of the UK to exploit quickly new scientific discoveries and inventions. The trouble here, and in the delays in producing marketable products, lies, in Mr. Lucas's opinion, in too great a dispersion of available technical manpower. There is too much duplication. In 1959 the number of separate companies designing and manufacturing particular lines was as follows:

Power transformers ...	19	Control gear	34
Steam turbines	11	Small sw and fusegear ...	32
Domestic appliances ...	67	Domestic radio, TV ...	60
Switchgear	50	Semiconductor devices ...	26

Mr Lucas welcomes as "fortunate" the trend of recent years towards larger industrial units which can support industrial research and development effort more in keeping with the demands of modern industry. It is a trend which must be expected to grow, and which must be encouraged to grow if technical manpower is to be used efficiently.

The central portion of the inaugural address is concerned with the development over the years of the electronics and power sections of the industry. Included is a prediction that the next 50 years may see developments in electric power engineering as spectacular as the past 50 years have been in electronics.

Overall, Mr Lucas estimates that the electronics industry has trebled its output during the past ten years. Today, it claims a gross output of between £400 million and £500 million a year, and finds employment for between 350,000 and 400,000 people. If the power side of the industry is to develop as seems possible, then the power engineer of tomorrow will need a wider and more fundamental understanding of modern physics and an outlook unfettered by a fixed frequency concept.

The Application Engineer

Discussion of power and electronics developments in juxtaposition highlights the question—is there any connecting link between these two great sections of the electrical industry? It is known that collaboration exists and must become closer if both are to make full contribution to Britain's future prosperity. The link may lie in the application engineer.

Each industry calling electricity to its aid needs the services of application engineers who have knowledge of developments in both power and electronics. Fuller understanding of closed loop servo principles, which advanced so rapidly during the war, greatly broadened the scope of application engineering. They have led to the idea of "control" as an indispensable study for engineers of the future.

Despite these considerations, sight must not be lost of the need for the application engineer to have, first and foremost, an intimate working knowledge of the industry he serves. Although the principles underlying application in various industrial fields are common to all, the fields of application are specialist fields. So the industrial application engineer is as much a specialist as the designer of alternators or computers.

One Profession?

Does this mean that if we accept two separate disciplines for study, power and electronics, it is necessary to accept a third for "application"? Mr Lucas sees an underlying common discipline for all three so far as electrical engineering is concerned. The problem requires study by educationists, and the difficulties of finding a satisfactory solution are not to be underestimated.

Apart from formal educational investigations, there is a need to look at practical training schemes, to make them more appropriate for the university graduates who will become the key technical and administrative personnel in the future. It may well be that it will be possible to offer such schemes only to selected men who can benefit from the type of training involved.

Bulk supply tariff revised

DIFFERENTIALNIGHT—DAY kWh RATES

CHANGES in the design of the bulk supply tariff for 1962-63 from that applying over the past three years are apparent from details released by the CEGB last week. Amongst them are a differential unit rate for night supplies and a changed basis for calculation of the maximum demand charge. An official estimate is that changes in the tariff will increase the cost of electricity to area boards by little more than ½%.

Essentials of the tariff are indicated, right. It provides the basis on which area boards pay the CEGB for electricity supplied. The tariff continues the special kW maximum demand charge offered in respect of consumers willing to reduce their demand at short notice from the CEGB, and the kW charge component of the tariff ignores these consumers in its general calculations.

M.D. Charge

On the face of the tariff, the maximum demand charge is increased by 13s/kW to £8, but the actual effect of this change is made uncertain by a new method of calculating chargeable maximum demand. The existing tariff hypothecates an aggregate of the half-hour maximum demands of all area boards (26·35 million kW in 1961-62) and arranges that each area board shall pay on the assumption that its maximum demand is a calculated fraction of the hypothecated total. The fraction is calculated by dividing the recorded maximum demand of each area board by the aggregates of the demands of all area boards plus those of any other customers of the CEGB (the railways, for example).

In the new tariff the same principle is followed, with the substitution of 29 million kW as the hypothecated total; but the basis on which the fraction is calculated is changed. It is now demand at the time of maximum half-hour demand on the CEGB as a whole that counts, not the maximum demands of each area board. Moreover, a further averaging is introduced. The maximum demand used for the purposes of calculation is based on the average of demands at time of CEGB peak half-hour before 31 December and after 31 December, respectively.

The effect of the tariff, assuming that other direct consumers of the CEGB pay the same as the area boards, is that £232 million will be received by way of m.d. charges from other than special consumers, compared with £194 million in 1961-62.

Running Charge

There is a single rate for energy in the existing bulk supply tariff (0·42d/kWh, based on fuel at 60s/ton, subject to 0·00055d/kWh adjustment for each variation of 1d/ton in the price of fuel). In the new tariff there are two rates, one for the 16 hr starting at 7 a.m., the other for the remaining eight hr of the day. The rates are based on fuel at 85s/ton, with a reduced adjustment of 0·000495d/kWh for each 1d/ton variation.

According to the CEGB, the effective price of fuel is currently 91s/ton, so the change brings the tariff nearer reality. For the existing tariff, 85s/ton would mean a charge of 0·585d/kWh for all units, whereas the figures in the new tariff are 0·58d during the day, 0·47d at night.

The new tariff maintains the differential offered to special consumers willing to reduce demand on request at £4 2s. A new provision makes possible payment of a reduced rebate for existing supplies brought under the special arrangements, the reduction to extend for up to three years. However, there are some changes in the conditions that accompany the offer of the special rate, which, it has to be remembered, is made to area boards in respect of consumers rather than to the consumers themselves.

This type of consumer has to have a demand (called nominated firm kilowatts) of at least 25,000 kW, which continues during the restricted period. This demand is now based on a five-minute average during the period of restriction. Any excess over that nominated value has to be paid for at £8/kW, and the new tariff introduces a statement that the payment for excess kilowatts on any one occasion will not entitle the consumer to exceed excess kilowatts on another occasion without additional charge.

1962-63 Bulk Supply Tariff for Area Boards

THE form of the tariff is a kilowatt maximum demand charge plus a running charge differing according to the time of day at which energy is taken. The running charge is adjusted according to the cost of fuel, and the kilowatt charge may be reduced by special agreement where there are consumers in an area willing to reduce their loads instantly on the request of the CEGB.

kW charge for other than special consumers.

£8/kW of maximum demand, based on a national half-hour maximum demand (excluding special consumers) of 29 million kW. Each area board to pay according to its proportion of the aggregate demand at the time of peak half-hour demand on the CEGB. The average of the peak demand before 31 December in the supply year and the peak demand afterwards is to be taken.

kWh charge for all consumption.

0·58d/kWh for each kWh supplied between 7 a.m. and 11 p.m.

0·47d/kWh for each kWh supplied between 11 p.m. and 7 a.m.

Both these charges are subject to an increase or decrease of 0·000495d/kWh for every penny by which the calculated fuel cost for power stations in the area concerned varies from 85s/ton of 11,000 B.Th.U./lb fuel. The calculated fuel cost is an adjusted value taking into account the proportion of energy supplied in the area which is transmitted into the area rather than generated within it. The imported energy is reckoned to be related to the national average fuel cost increased by 6s/ton.

kW charge in respect of special consumers.

£8/kW demand averaged over any five minutes of any period during which the CEGB has requested restriction of demand by the consumer.

£3 18s/kW of restricted demand, i.e., the difference between normally calculated half-hour maximum demand of a special consumer between 7 a.m. and 7 p.m., Monday to Friday, and the number of kW charged at £8.

Highway lighting and the road user

DRAFT CODE DISCUSSED AT A.P.L.E. CONFERENCE

PERHAPS the most significant event of this year's APLE Conference was the release for discussion, on Wednesday afternoon, October 4, of the draft revision of Part 1 and Part 2 of C.P.1004, Code of Practice on Street Lighting. A brief survey of the document is given on the next page. Discussion was, to some extent, limited by the short time available for a study of the document but, nevertheless, delegates were able to express opinions on a number of points before the session came to a close.

In the absence of Mr J. M. Waldram, chairman of the Drafting Committee, who was in America, an introductory summary was presented by Mr G. Grime, of the Road Research Laboratory, and he was supported on the platform by Mr Granville Berry and Mr W. Robinson. Mr F. C. Smith was in the chair.

Discussion

Mr R. Stevens (Atlas Lighting) opened the discussion by asking for more information on required lantern performance. In order to achieve the levels of illumination called for in the Code, it was essential to lay down performance targets, but these must have tolerance limits included. Have such targets been set and how have they been arrived at? He was of the opinion that few present-day lanterns would measure up to the Code if properly tested and this, of course, had many implications. It was logical to say that the Code was not the proper place to lay down limits of lantern design; this was more the function of a British Standard. He suggested that the Code should lay down the target figures for light output and distribution and that a Standard on lantern design be prepared in collaboration with the Code Drafting Committee. Finally, on the subject of critical heights, these were relics of days when the output from light sources was limited. Today, the conditions are not the same.

Mr D. Clark (Norwich) enlivened the proceedings by showing a number of slides illustrating the horrors of some modern lighting standards and fittings which exhibited signs of advanced deterioration after a few months in service. He also pointed out the hazards of some road junction layouts, where similarity of colouring between highway and footpath made distinction difficult at night.

Mr A. L. Percy (Huddersfield) referred to the provisional section on roundabout illumination and asked for exceptionally distinctive signs at night some distance before the roundabout is reached. He suggested a sign comprising a number of bare vertical fluorescent tubes on a column which would be visible and unmistakable by the driver, even in conditions of low visibility.

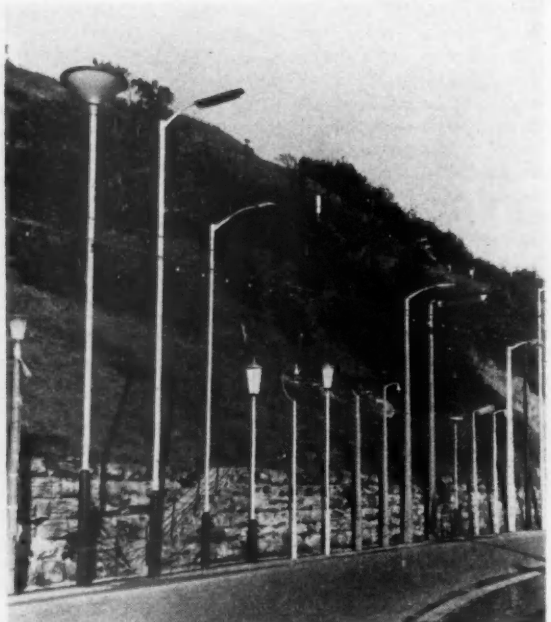
Mr J. C. Cotton (Portsmouth) referred to the section on road surfaces and the sentence "A more satisfactory alternative is to avoid the use of such surfaces." He suggested that this was unrealistic and should be omitted. A non-slip road surface was of prime importance and all other factors were subsidiary. Lighting must be made to suit the surface, not the other way round.

Mr P. H. Renwick (Newcastle) suggested that, in regard to the cost of providing lighting on motorways, the Road Fund, and not local rates, was the obvious source. He hoped that representations to the Minister would be made. Mr M. W. Hime (Seeboard) asked if a maximum height of 40 ft was enough. In view of the development of light sources with better efficiencies and higher loadings, should not the Code anticipate the future and refer to "40 ft and above"?

Mr Stanforth (Scarborough) asked if the Code would not make many present installations, some of very recent completion, out-of-date. This could be serious to the public lighting authorities, who would be faced with more expenditure if they were to be brought up to the recommended level. He also thought that all-night lighting, at a reduced level, should also be laid down as a universal recommendation. In residential areas locally, one lamp in four was left on all night, the remainder being extinguished after midnight. Mr C. Elliott (Doncaster) asked for the Code to give guidance on the subject of maintenance, and other speakers also contributed.

The Panel Replies

Replying, the panel jointly and severally thanked the delegates and promised that the comments would be considered by the Committee. On the matter raised by Mr Cotton, this was not so unrealistic as might be imagined. There were a variety of materials from which non-skid



Part of the extensive outdoor display of lighting standards and fittings in the Spa Access Road, Scarborough. This section includes lanterns from the "Revo" range

surfaces could be made and quite a lot could be done to improve their reflectivity without impairing the non-skid properties. The Road Research Laboratories had the study in hand and was making progress. The point raised by Mr Stanforth had its counterpart elsewhere and the case of a purchaser of a car was quoted in which the price was dropped only a few days after delivery on the marketing of a new model. But the purchaser still had a good car for his money; similarly, a modern lighting installation might not be quite up to the present levels of the Code but, assuming that it had been intelligently planned and executed, would still provide good lighting and only rarely would it need serious modification.

Colour No Bar

The paper presented by Messrs J. T. Grundy and G. K. Lambert on Thursday, 5 October, on the subject of Colour in Public Lighting attracted a good attendance, which was rewarded by an excellently staged presentation of the relationship of eye response to different colour rendering light sources and the many ways in which the mind's interpretation of what the eye sees can be influenced by past memory patterns. The demonstration included one of the rare presentations of the Land Colour System and also a brief but effective illustration of the Purkinje effect by which the relative brilliance of two coloured surfaces can be shown to change at low levels of illumination.

In regard to the choice of colour rendering on public highways and in city centres, it was apparent that the average person had accepted the highly efficient but monochromatic sodium lamp for motorways and main roads but that, where the greater number of users were pedestrians, better colour rendering sources were preferred. Even in city centres, the monochromatic light from sodium lanterns could be used with spill from shop lighting providing a balancing component. In Bolton the experiment had been tried, with notable success, of enclosing two 200 W sodium lamps with two 500 W GLS lamps in a single lantern, the overall light output being short only in the blue and green parts of the spectrum. An experiment was now being undertaken to correct this by enclosing a green fluorescent tube as well.

On Friday, 6 October, Mr E. B. Sawyer spoke on the subject of social and economic aspects of street lighting and endeavoured to relate the efficiency of installations with the cost of running and maintaining them. It is, he claimed, said that good street lighting tempts motorists to drive faster and that, as a result, roads become less safe. What evidence there is does not support this contention. Because of the requirements of the ever-increasing volume of traffic, the standard of lighting which will have to be accepted calls for enterprise and some imaginative changes in the approach of spreading too little light over too small an area.

Annual Luncheon

The annual luncheon of the Association was held at the Royal Hotel on 4 October, where the guests included the Mayor and Mayoress of Scarborough and Mr C. T. Melling, deputy chairman of the Electricity Council. It is understood that the Conference next year will be held at Blackpool.

Revised Code for Street Lighting

IN the original form C.P.1004 was in two parts dealing with (1) Traffic Routes, and (2) Roads other than Traffic Routes, respectively. In the present redraft Part 1 covers *General Principles* and Part 2 *Lighting for Traffic Routes: Groups A1, A2 and A3.* That is to say, Part 2 of the older version has not yet been covered and will, eventually, appear as Part 3, covering Group B roads with a new Part 4 to cover Group C.

In general, the basic principles laid down in the original code are maintained but the classification of the traffic routes has been expanded and, at the same time, the manner of specifying parameters of installations has been considerably modified though the underlying principles are much the same. The more fundamental changes are the method of specifying the flux to be provided from each lantern instead of per 100 ft of road and, of course, the amount of light has been increased to suit modern conditions of traffic and efficiencies of light sources. The general effect is a trend towards installations having about the same spacing as originally but with higher mounting heights and greater light outputs though less glare.

Classification

The new classification breaks the original Group A into three sub-groups, A1, *Trunk Roads and Major Class I Roads;* A2, *Other Class I Roads and More Important Class II Roads;* A3, *Less Important Class II Roads and Class III Roads.*

Group B, originally subdivided into B1 and B2, is now a single group covering minor Class III roads and unclassified roads carrying only local traffic.

Group C is subdivided into C1, *Lighting for Town and City Centres;* C2, *Lighting for Bridges and Flyovers;* C3, *Lighting for Tunnels and Underpasses;* C4, *Lighting for Roundabouts and Complex Junctions;* C5, *Lighting for Roads with Special Requirements.*

The general principles of street lighting are next expounded in considerably greater detail than formerly with some recommendations on lantern design that give more latitude to the designer. On the geometry of installations, detailed recommendations are made for lantern distribution requirements in non-cut-off systems and the limitation of 25 ft mounting height has been removed. In its place there are six tables relating height, spacing, light output/lantern and overhang, and a basic table for the three A groups. A similar set of tables is given for cut-off systems.

Planning of an installation is then discussed with recommendations for lantern arrangement, on the straight, at junctions, bends, gradients and humps, roundabouts and urban street intersections.

Finally, there is a worked-out example of planning and an appendix on the siting of non-cut-off lanterns on bends.

Perhaps one of the most important sections of the code is that relating to siting. The vast majority of present-day installations will fail to meet the recommendations in 1.206 that columns on roads with no speed limit, or one in excess of 40 m.p.h., should be 5 ft or more from the kerbside and not less than 18 in., but preferably 5 ft or more where the footway will allow, in other roads. The hazard of columns mounted on the kerbside to oncoming traffic which may run into a skid or have to mount the pavement to avoid a collision is so obvious that this part of the code, in the interests of road safety both by day and by night, seems so important as to become mandatory.

Having regard to the complexity of street lighting problems, the document attempts to cover the major aspects and many of the minor ones and does so with commendable detail. The Committee now invite comments and criticism from all who may be able to help which should be sent to British Standards Hse by 8 Nov.

AB(ELCP)6042. Draft British Standard Code of Practice on Street Lighting (Revision of C.P.1004—Pt. I and Pt. II). British Standards Institution, 2 Park St, London W.1. Copies are available to subscribing members free of charge and to non-members at 5s post free.

new products and appliances

Hearth-type fire

A HEARTH-TYPE fire with coal or log effect has been launched by Main. Known as No. 701 Fire, it is loaded to 2 kW and is designed to fit standard 16 in. fireplaces in place of the existing grate. The unit has twin 1 kW elements controlled by separate switches. The flicker effect is in itself a complete unit and so can be used without the elements if required. Constructed of cast-iron, the heaters are finished in copper lustre vitreous enamel and are 19 in. wide, 14 in. deep and 11¼ in. high. Prices are £10 18s 3d for coal effect and £11 19s 7d for the log effect. *R. and A. Main (Electrical Division), 48 Grosvenor Gdns, S.W.1.*

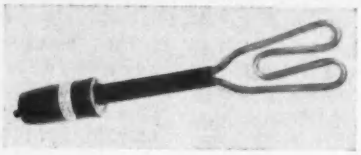
Waste disposer is portable

CLAIMED to be the first portable waste disposal unit of British manufacture is the "Clear-a-waste," which was announced recently. It sells at 30 gn and a standard model for fitting beneath sinks is available at 33 gn. The unit stands on the draining board with a flexible connection to the waste drain. An alloy impeller is said to shred waste matter to micro-particle size and also to grind bones and even glass. The impeller is driven by a ½ h.p. motor giving 13,000 r.p.m. and a reduction pulley system is used to overcome the tendency to stall when overloaded. The unit is suitable for either a.c. or d.c. voltages. The outer casing is of glass fibre and the whole unit is double insulated. A kit to convert the portable model to a permanent fixture beneath the sink costs 4 gn. *Delapena Mechanical Developments Ltd., Russell Gdns, W.14.*

Portability is a feature of this 30 gn disposal unit

Direct contact firelighter

OPERATING on the direct contact principle is a firelighter introduced by Eltron. It has a tubular element in the form of a fish tail which is placed beneath fuel until ignition takes place. Manufacturers suggest that small pieces of house coal should be placed on the element until combustion takes place



and then a fire built up with required fuel. The unit will, however, ignite coke by direct contact but this is said to take slightly longer. The firelighter is loaded to 800 W. It sells at £3 8s 6d plus 13s 9d purchase tax. *Eltron (London) Ltd., Strathmore Rd, Croydon.*

Illuminated tree

A COMPACT Christmas tree with lights already fixed to its branches has been added to the Philips range of decorative lamps. Twenty miniature lamps with star-shaped backings are attached to the branches and the tree stands a total height of 2 ft 6 in. on a non-tilt plastics base. It costs £2 10s 4d. *Philips Electrical Ltd., Shaftesbury Ave, W.C.2.*

C.T. for Amprobe

THE "Amprobe" snap-round testing instruments for measuring voltage, current and resistance are well known. Now a simple accessory, the "Deca-tran," extends the range of current readings by up to ten times. It is, in fact, a second snap-round transformer the output of which is applied to the corresponding "Amprobe." The jaws of the Deca-tran will encircle 2 1/16 in. dia round or 3 in. by 2½ in. rectangular busbar. *Pyramid Instrument Corp., UK Sales Div., Victoria Mills, Gamble St, Nottingham.*

The "Deca-tran" is a useful accessory which, applied as shown, extends the range of "Amprobe" measuring instruments

Improved industrial heater

IMPROVEMENTS to their industrial infra-red heaters have been made by Thermodare and models will be available from 1 Nov. The company have discontinued industrial heaters with loadings less than 800 W as they feel their domestic range caters for the lower powered units. In the new design maintenance has been simplified, as the element assembly and guard is hinged to swing forward and upwards to give easy access to element connections and reflector. The reflector too is easily removed for cleaning or replacement and is held in place by a new ceramic stand-off insulator. Suspension arms are fitted as standard and provision has been made for alternative conduit suspension. The heater can be easily angled by means of a ratchet stop and has a hammered bronze finish. Prices of the heaters are as follows:

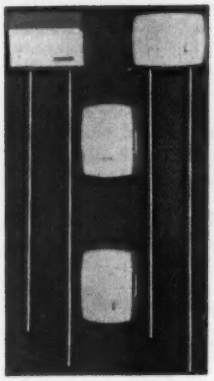
Loading	Price
0·8 kW	£6 12s 6d
1·2 kW	£7 10s 0d
2 kW	£9 15s 0d
3 kW	£14 18s 6d
4 kW	£16 14s 0d

Thermodare (GB) Ltd., Petty France, S.W.1.

Metal disintegrator

A NEW method of solving the problem of removing broken taps and drills from castings or valuable metal components is to "disintegrate" them. Using the technique of spark erosion, a new device, the "Dohm Disintegrator," completely destroys the core of the broken hardened steel tool so that it collapses within the hole without harming the surrounding metal or threads. The tool, illustrated here, is portable, simple to operate and is supplied with electrodes to fit holes from 1/16 in. to ¼ in. dia. As an example of the speed of operation, it will "disintegrate" a 5/16 in. high-speed steel tap ½ in. long from a grey iron casting in 1½ min. The price is £130. *Dohm Ltd., 167 Victoria St, London, S.W.1.*

Spark erosion is the secret of this new device, the "Dohm Disintegrator," which destroys the core of broken taps or drills in castings



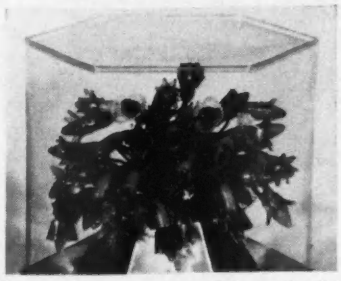
Quartet of door chimes from M-R. Top right and left, the more expensive units "Salisbury" and "Canterbury"

Range of chimes

LATER this month, Morphy-Richards are introducing a new range of door chimes ranging in price from 18s 9d to 54s 4d. There are four models and most inexpensive of these is the "Guildford," designed for the single door residence. It produces a double chime and can be operated from standard bell batteries or from mains supply with the addition of a transformer. Slightly more expensive is the "Exeter," which gives a double chime for the front door and a single note for the back door; this, too, can be operated from mains supply through a transformer or from two 4½ V batteries. The "Salisbury" model has two lacquered alloy chime tubes fitted to an off-white stove enamelled suspension case. Elite in the range is the "Canterbury," which has a rose-grey suspension case in moulded polystyrene with a grained off-white wrap around panel. This model has two alloy chime tubes. *Morphy-Richards (Cray) Ltd., Conduit St, W.1.*

Sub-miniature decorative set

READY for the festive season is a set of sub-miniature decorative lamps recently announced by Atlas. They are available in strings of 20 or 40 lamps and are packed beneath a transparent cover in the form of a fountain spray. Each lampholder is fitted with decorative plastics petals and lamps are in the form of pine cones. Colour combinations of petals and lamps are said to give an attractive effect when illuminated. Spare lamps supplied in blister packs are available at 10d each, four to a pack. Twenty-lamp sets sell at £1 8s 6d and the larger 40-lamp set costs £2 9s 3d. Both prices include purchase tax. *Atlas Lighting Ltd., Thorn Hse, Upper St. Martin's La, W.C.2.*



Miniature decorative sets of lamps by Atlas

New terminal blocks

THE latest addition to the extensive range of "Metway" terminal blocks is a group of flexible assemblies in polythene with a special feature, three internal projections on the terminal screws, which renders them captive on insertion. Once screwed down they will not loosen through vibration. The blocks, which are flexible, are made in four sizes, 5 A, 10 A, 20 A and 30 A, and incorporate 12 ways. The prices are: 5 A (34201) 2s 6d per block; 10 A (34203) 3s 9d per block; 20 A (34205) 7s per block; and 30 A (34207) 8s 6d per block. The blocks can be cut to make up shorter terminal strips or can be mounted end-to-end to make longer ones. *Metway Electrical Industries Ltd., Canning St, Brighton 7.*

Shelves by Dexion

A NEW range of shelves for use with "Dexion" slotted angles, though similar in dimensions to those already listed—36 in. by 12 in., 18 in., 24 in., 30 in. and 36 in.—is available in three strengths. The two shorter are in light and standard; the two larger, in standard and heavy; and the 24 in. in all three gauges. Light duty takes up to 150 lb; standard up to 450 lb; and heavy up to 900 lb. Delivery is free, ex stock. The range, comprising 11 shelves in all, is particularly suited to the larger sizes of angle. — *Dexion Ltd, Maygrove Rd, London, N.W.6.*

A compact miniature two-pole changeover relay

Small plug-in relay

A COMPACT relay of small dimensions with plug-in octal base fitting and baseplate, the Type E.B. two-pole changeover relay is designed for continuous and frequent operations on control systems up to 1/sec. Normal coil voltages are 24 a.c. or 220 a.c. but it can also be supplied wound for any voltage, a.c. or d.c. between 6 V and 110 V or even up to 400 V a.c. or 220 V d.c. with a series resistor. Contact ratings are 6 A up to 250 V a.c. or 2 A up to 400 V d.c. On a.c., closing time is 10 millisec and opening 8 millisec; on d.c., both closing and opening time is 8 millisec. The relay weighs under 3½ oz and dimensions are 2¼ in. by 1⅞ in. by 1⅛ in. *Dewhurst and Ptnr., Ltd., Hounslow, Middx.*

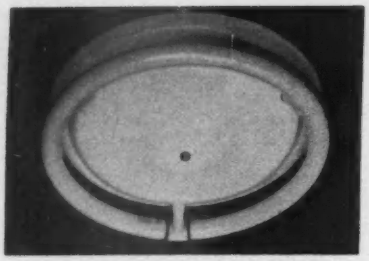
'FRIDGE-FREEZER FOR UNDER £100

THE first 'fridge and freezer by a British firm, for less than £100, has been launched by English Electric. Designed to give housewives a storage capacity of 50 lb of home or commercially frozen foods, the appliance has a freezer set above a 4·1 cu ft refrigerator. Both freezer and 'fridge have front-opening doors, allowing easy access to their interiors. Called "Fresh and Freeze" this model has the distinctive EE "Slimline" styling to blend with modern kitchen design.

Simple to operate, the temperature of both refrigerator and freezer is controlled by a single dial set in a central position in the top of the 'fridge. The dial gives below-zero temperatures for the freezing compartment, which is full width, and 40°F in the refrigerator; with warmer or cooler settings. A feature of the refrigerator section is automatic defrosting, in which defrost water collects in a 1 pt capacity container which is easily removed without disturbing food. There is no automatic defrosting in the freezer unit as the process is necessary only at intermittent intervals. Also in the freezer is a removable shelf with space for two ice trays. Storage facilities in the refrigerator are well laid out, the four shelves giving ample space. Two separate compartments are provided for salad stuffs.

Door liners in both the refrigerator section and in the freezer give extra storage space and both doors are sealed magnetically. The appliance, which will be available next March at 93 gn, is finished in white or cream with chrome-plated door handles and trim. Interior finish is in white with aquamarine door panels and grey shelving. Slightly taller than the normal refrigerator, this model stands 49¼ in. high and requires 3·16 sq ft of floor space. It is 21 in. wide and 21⅞ in. deep. *English Electric Ltd., EE Hse, Strand, W.C.2.*

Costing less than £100, EE's "Fresh and Freeze"



Designed to take circular 40 W tubes is this Vanguard fitting

Fluorescent fitting is circular

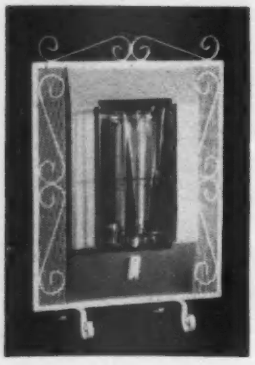
DESIGNED to accommodate a 40 W fluorescent tube is the latest Vanguard lighting fitting, circular in shape. Other fittings will be available for 32 W and 22 W tubes and a larger twin model will carry 140 W or 132 W tubes. The fitting is constructed of sheet steel finished in white stoved enamel. It uses low-loss chokes and sells at £4 10s 5d inclusive of purchase tax. *Vanguard Engineering Co. Ltd., Woolwich Church St, S.E.18.*

Useful transformer

A RESIN-CASE encapsulated transformer, which may be used either for the measurement of current or voltage, is now available under the name "Factotum." It is particularly suited to use in technical schools, laboratories or wherever a transformer is required with an easily varied ratio. It comprises a continuous ring of cold-rolled silicon iron evenly wound with two identical coils which may be connected in series, parallel or even used independently according to how the four terminals are connected and/or bridged. A third coil may be wound on by hand according to the application for the time being. The continuous output is 500 VA. The weight is 13 lb. *Smith Hobson Ltd., Hersham Trading Estate, Surrey.*

Fire has wrought-iron screen

DESIGNED to fit into standard fireplaces is a 2 kW fire set in a wrought-iron screen. Called "Laredo," the heater sells at the competitive price of £9 5s 9d including purchase tax. Finish is available in white/gold, black/white, burgundy/white. *D. C. Lester and Co. Ltd., Coventry Rd, Birmingham 10.*



Wrought-iron has been extensively used in the finish of this fire

Relays

NEW relays and solar switches from Ericssons include pin-lift and card-lift relays incorporating the standard GPO movement with plug-in contacts and up to 30 terminals, a transistor relay operable on a 4 micro-sec pulse and repetition frequencies up to 100 c/s, a solar switch incorporating a cadmium sulphide photo-conductive cell and snap action relay which operates to close at 1 ±0·5 and open at 3 ft. candles or above and two Type 53 a.c. clapper type relays. G. H. Maughan have also introduced a new multi-contact relay of the three-pole changeover type and rated at 7½ A a.c. or d.c. up to 500 V. It is claimed that this is silent in operation, is free from contact bounce and only weighs 5½ oz. The dimensions are 3¾ in. by 1¾ in. by 2¾ in.

Ericsson Telephones Ltd., 22 Lincoln's Inn Fields, London W.C.2.

G. H. Maughan Ltd., Manchester.

Holes for printed circuits

A FULLY automatic drilling machine for making holes in printed circuit boards to take components is now in limited quantity production at the Edinburgh factory of Ferranti Ltd. The machine has been designed to meet a growing demand from production engineers engaged on the manufacture of transistorised computers for a means of producing, with accuracy, large numbers of circuit boards complete with components attached.

The machine incorporates two drilling heads allowing for either tandem or single spindle working, a hydraulically operated co-ordinate table to carry the printed circuit boards and a control system for regulating the positioning of the holes. Positioning of the 20 in. by 14 in. drilling table with printed circuit board attached is effected in two stages; first, a rough positioning achieved by a perforated plate and photo-electric cell combination and accurate positioning by a mechanical indexing system based on a half nut and precision rack. Positional accuracy of ±0·001 in. can be obtained with repeatability to within 0·001 in. In operation, the pattern of holes is systematically drilled row by row with each row brought accurately into line by a row of marker holes in the template.

The machine can accommodate single boards or stacks of boards up to a total drilling depth of ⅜ in. with drilling dimensions in an area 11½ in. by 17½ in. Rate of output naturally depends on the number of holes/board and depth of drill, but is extremely high. For example, the 288 holes/board for the Argus computer, drilled in two stacks of four boards simultaneously, require about 1·8 min, including loading and unloading. Chuck capacity is 0-5/32 in. with speed automatically governed by drill size and work.

The machine, which weighs about 18 cwt, is self-contained and takes about 1·5 kVA of three-phase a.c. *Ferranti Ltd., Hollinwood, Lancs.*

A fully automatic drilling machine for accurately drilling holes in printed circuit boards

New tool for cleaner

A SHAPED hose handle is the new effort-saving attachment announced for Electrolux's "Sixty-four" cleaner. The handle is slightly angled to assist in cleaning window pelmets and other out-of-the-way places. The cleaner is supplied with one extension tube instead of the more usual two, and a variety of tools suitable for most applications. The cylinder is finished in two-tone sepia and ivory, and sells at 20 gn including purchase tax. *Electrolux Ltd., Regent St, W.1.*

Wall fittings with modern touch

TO match modern interior décor, Linolite have introduced a range of wall mounting fittings in contemporary styling. Somewhat distinctive in design, they are available with either single or twin lamps on slender curved stems mounted on a domed base. They are wired to take 30 W or 60 W, 248 mm clear tubular lamps. A variety of plain and patterned shades are available for these fittings, which cost £6 4s for the twin unit and £3 10s 9d for the single. A matching portable lamp in similar design can also be supplied, costing £4 1s. *Linolite Ltd., 118 Baker St, W.1.*

Atlas again cut prices

AFTER announcing price reductions last week in their "slickstart" versions of their Superslim range, Atlas have cut the cost of their "switchstart" fluorescent fittings. Batten fittings including gear and tubes now sell at prices ranging between £2 16s for a 2 ft 20 W, to £7 2s for the 8 ft 125 W. *Atlas Lighting Ltd., Thorn Hse, Upper St. Martin's La, W.C.2.*

50 c/s traction experience

BASIC SOUNDNESS OF 25 kV SYSTEM DEMONSTRATED

TROUBLE with electrified trains of British Railways has been widely reported; the successes have not been so fully recorded. A preliminary attempt to right this is made by Mr J. A. Broughall, assistant chief electrical engineer, BTC, in a paper he presented in Brazil last month on progress of electrification at industrial frequency in Great Britain. Experience so far shows, according to Mr Broughall, that the decision to adopt the 50 c/s system, even in the particularly unfavourable conditions in Great Britain, is sound and that the dual voltage 25/6·25 kV version of that system can also give a satisfactory account of itself when circumstances demand its adoption.

Fixed Equipment

Fixed equipment for power supply has behaved well in almost every respect. The importance of having power supply transformers capable of withstanding the short-circuits inevitable with traction has been demonstrated on some sections of the line where, in a year or so, short-circuits have already occurred in numbers normally to be expected over the whole life of the plant concerned. Impedance protection used in conjunction with the circuit-breakers has behaved well, but there have been occasions when quick back-up would have been useful. Modifications are being made to achieve this.

Clearances for the overhead line equipment have been shown to be capable of reduction. Experiments are suggesting that clearances at 25 kV can be reduced to 8·0 in. static and 6·0 in. passing, which will materially reduce the number of occasions on which recourse to 6·25 kV will be necessary.

Porcelain insulators, although giving good service, have proved to be vulnerable to deliberate damage by stone-throwing. Great importance is attached to the use of resin-bonded glass-fibre insulators. Insulators of this type are used to separate electrical sections. Mr Broughall remarks that it begins to be possible to use this material with confidence if not yet with the same assurance as for materials that have been known for many decades. After only a year of service in the contact line and elsewhere on a 25 kV, there has not been a single case of a failure of a p.t.f.e.-protected glass-fibre insulator.

Mobile Equipment

D.C. series motors are used for all the rolling stock. Most of the motors have given service over many hundreds of thousands of miles without a single motor failure. Mercury arc rectifiers of several makes have, with one possible exception, all given satisfactory service, despite initial difficulties with the shutters forming part of the ventilation arrangements. What is considered very important is the satisfactory performance of the semiconductor rectifiers. Amongst reasons for preferring semiconductor rectifiers, apart from the elimination of risk of back-firing, is the simplification possible by omitting excitation and ignition circuits and complex pre-heating circuits. All in all, rolling stock powered with semiconductor rectifiers has run over three million miles without failure of a rectifier as such.

In a few months, British Railways will receive the first locomotive using static devices (semiconductors and transductors) for control of voltage to the traction motors instead of the contactors at present associated with the tappings on the transformer secondary. The absence of moving parts will, of course, be welcome, while the smooth control of traction motor current made possible will allow an effective increase in adhesion of about 10%.

Transformers were accepted as completely reliable apparatus when designing the trains. Although in general they have proved so, there have been exceptions which have caused some of the serious failures of electric traction equipment. There has been no case of failure of the primary windings, but the secondary windings which supply the rectifier and the tertiary windings which supply the auxiliaries have not all been equally successful. Transformers using the interleaved pancake winding have not been involved in failures. On the Glasgow line, there was trouble with transformers having helical-type secondary windings, but Mr Broughall says it remains open to question to what extent the failures were due to use of that type of winding and how far they are due to other circumstances including frequent transition to 6·25 kV.

Work is proceeding on simplifying the protective devices on traction equipment. While some equipments are now thought to be over-elaborate, in other cases a need for additional apparatus has been shown. The motors of one fleet of minor coaches suffered considerably from over-voltages, particularly when working in the 6·25 kV areas. This was traced to development of transients caused by rapid cut-off of the air-blast circuit-breaker, and most of the trouble disappeared as soon as the good earth was provided near the motors. The remaining troubles are confidently expected to cease when capacitor-resistor circuits are fitted. Investigations proceeding at present aim to modify the characteristics of the circuit-breaker so that the over-voltages imposed in the circuit are materially reduced.

Economies

Summing up arguments for the 25 kV, 50 c/s system, Mr Broughall says that the saving associated with absence of h.v. cable systems linking one substation to its neighbours and of the associated switchgear represents 60% of the total cost of fixed equipment in British main-line electrification. In countries other than Britain, it is unlikely that the same problem of reduced clearances and 6·25 kV sections would be met. About 5% of the cost of power supply equipment has been devoted to use of booster transformers and/or return conductors to avoid trouble "with a dense and often out-moded telecommunication system." This also might not be necessary overseas.

News of the Week

FERRANTI'S ITALIAN VENTURE

40% stake in transformer company

OBVIOUSLY well satisfied with the working of a two-year-old agreement, Ferranti Ltd. have now acquired a 40% stake in the Italian transformer firm of Industrie Electtriche di Legnano of Milan. Early in 1960 the two companies entered into an agreement providing for the exchange of research and development information, and this latest arrangement provides Ferranti Ltd. with an investment, said to be around £400,000, in the Italian concern, which is an old-established firm making a wide range of transformers, and is currently producing units up to and including 400 kV. A similar investment in the concern is now also held by Societanazionale per lo Sviluppo Impresse Elettriche S.p.A., an Italian investment company.

Under the earlier information exchange agreement there were frequent exchanges of visits between chief executives and technical staff of both companies, and Mr R. M. I. Hobill, manager of the Transformer Dept. and a director of Ferranti Ltd., who took an active part in the negotiations, has said they consider the interest obtained in the Italian concern will be of mutual advantage, while affording Ferranti's more ready access to the European Economic Community.

Nuclear collaboration with Pakistan

GOING beyond the present exchange of reports and the training given to Pakistan scientists, the UK Atomic Energy Commission and the Pakistan Atomic Energy Commission have now agreed to develop their collaboration to promote the peaceful uses of nuclear energy. Provision has been made for staff consultations as well as for assistance and advice on the uses of radio-isotopes. The eventual supply by the UK of nuclear research and power reactors for civil use in Pakistan is also envisaged.

PAPER MILL SET

ANOTHER order for a 5 MW passout-geared turbo-generator and associated condensing plant, valued at £125,000, has been placed with the General Electric Co. by the Reed Paper group. It will be installed alongside two existing GEC sets in the group's Empire Paper Mills at Greenhithe. Designed for inlet steam conditions of 600 p.s.i.g. and 800°F, the turbine will exhaust to a vacuum of 28½ in. Hg. The turbine will be fitted with a pressure-controlled passout for delivery of up to 80,000 lb/hr of process steam at 20 p.s.i.g. Hick Hargreaves and Co. will manufacture the condensing plant. The new 5 MW set is to replace an existing set and will be installed on the same foundations, with the condenser arranged axially.

TAKEOVER NEWS

THE boards of Hilger and Watts Ltd. and W. Ottway and Co. have reached an agreement whereby the first-named concern will offer to acquire all the 560,000 Ordinary 4s shares in Ottway on the basis of one Hilger 5s Ordinary share for every six Ottway Ordinary. Ottway directors recommend acceptance, and have agreed to accept in respect of their own holdings.

A CONTROLLING interest in Silas Hyde Ltd., Birmingham manufacturers of industrial ovens, stoving equipment, etc., has been acquired by Goodenough Pumps Ltd.

NEGOTIATIONS have been completed whereby Radio Services (Dorset) has become a wholly owned subsidiary of Robshaw Brothers, wholesale electrical and radio distributors. Radio Services will continue to operate as a separate entity within the group.

Hevac 1962

REPORTING that 45,476 people visited the first International Heating, Ventilating and Air Conditioning Exhibition at Olympia, the organisers announce that the next exhibition will be held in Sept./Oct. 1962. Thereafter the exhibition will be held every other year.

Cross-Channel link

INITIAL transmission commissioning tests of the cross-Channel cable link took place last week with the first interchange of power over the submarine cables. We understand that all tests are proceeding according to plan, with the aim of having the 200 kV d.c. link in full operation before the end of the year. Last week's tests were at low power, of course, but these are to be gradually increased over the next few weeks. The date at present fixed for putting the cable link into full commercial operation is 8 Dec.

£1½m Cable Contract

A RECORD contract, worth £1½ million, has been placed with Scottish Cables Ltd. by the South of Scotland Electricity Board. It covers the Board's annual requirements for underground mains cables for voltages up to and including 33 kV and the associated supervisory and control cables. First news of this contract was given by Mr Wm. Fraser, chairman and managing director of the company, during an interview in the BBC's "Down Your Way" radio programme from Renfrew last Sunday. Involving a total length of approximately 900 miles of cable, the order will make a major contribution towards the maintenance of a high level of activity and employment at the Renfrew works during 1962.

N.F.E.A. Apprenticeships

A FORM of certificate to be completed by the employer and handed to the apprentice in the electrical contracting industry when he finishes his training, has now been prepared by the National Federated Electrical Association, from whom copies are obtainable. But as the certificate can only be used in the case of approved apprenticeships, applications for copies must give the name and registration number of the boys concerned.

West Ham's wiring arrangement with L.E.B. criticised

THE arrangement whereby the London Electricity Board carries out all electrical installations for new Council buildings in West Ham was strongly criticised at the recent meeting of the borough's Housing Committee. The matter arose on consideration of a decision of the LEB to increase its charge for such work as from 1 Nov. Councillor Brooke asked, unsuccessfully, that the Housing Committee's recommendation to accept the increases should be referred back. He maintained that it was wrong that the LEB should have a monopoly for electrical installations on all new Council property. In his view the proposed increases (which would add about £2,900 on a £28,700 contract) were not necessary. The only way to ascertain if the LEB charges were competitive was to put the work out to tender, he added. "I am not prepared to accept these increases, and I ask the Council to sweep away this holy cow of the Housing Committee," he concluded. Chairman of the Committee, Councillor E. Kebbell, pointed out that the LEB charges had not been altered since 1956. While he did not welcome the increases, he felt the Board had made a good case for them.

Progress in Clean Air "Depressing"

PROGRESS in the implementation of smoke control orders under the Clean Air Act was presented in a depressing light by the chief public health inspector for Fulham, Mr G. W. Herrick, at the National Society for Clean Air conference at Brighton last week. He advocated a greater sense of urgency in the creation of new smoke controlled areas and pointed out that up to 31 March this year 115 local authorities in England and Wales had failed to submit programmes to the Minister of Housing and Local Government. Meetings of the Society and professional associations concerned had been overweighted with difficulties in creation and operation of smoke controlled areas.

In his own borough, Mr Herrick found that implementation of orders proceeded with ease, and indeed only one in four of the required conversions had applied for grant aid provided in the Act. This meant that the majority of householders were paying full cost of new appliances from their own resources. Many people in his area had taken to using electrical or oil fuel appliances. They also used more reactive smokeless solid fuels in existing grates even though this was uneconomical and could lead to supply shortage.

Central heating systems of which several new electrical methods have been introduced recently, were the subject of a paper by Mr W. F. B. Shaw of the DSIR Warren Spring Laboratory. He contended that for a comparatively small increase in running cost it was simple to change from single room heating to "whole-house" heating. The three main systems now in use were distribution in the form of either hot water or warm air and underfloor electrical heating. Installation costs of the latter system compared favourably with the other two, but when running cost of floor-warming was assessed on an approximate efficiency figure from the Building Research Station electricity proved more expensive for the supply of equal amounts of heat than gas-fired central heating. Conventional hot water radiator systems supplied by an electrode boiler or immersion heater circulator, could take advantage of "off-peak "tariff, but initial installation costs and space required presented problems. Because of the cost factor this system would be impracticable except in larger premises. Underfloor warming proved effective but, as maximum temperature range varies between 70°F and 80°F, heat transmission from floor surfaces was limited.

With a view to abating smoke in industry, the Society are considering promoting a Bill requiring certification of furnace operations. This has met with opposition from the TUC on the grounds of compulsion of operatives to attend courses being undesirable.

TRAINING JOINTERS

THE Eastern Electricity Board's policy of training their own employees for specific jobs has now been extended to jointers and to jointers' mates. At a "school" at Thorpe Bay, the process of changing labourers into jointers' mates and jointers' mates into jointers has so far resulted in six of each category having been trained. The jointers' mates receive instruction over four weeks, the labourers being taught in half that time.

£17,700 damages against N. Ireland Board

THREE witnesses testified in Belfast High Court this month that they had heard no warning concerning a 26 kV line on a building site on which they were employed, and the Bench placed 60% of the onus for negligence on Northern Ireland EB. As a result, the Board has to pay £17,700 to a 17-year-old apprentice bricklayer out of a total settlement of £29,500. The youth lost both legs beneath the knee and also his right arm, due to gangrene, after touching the line with a ladder and being thrown to the ground. The builder has to pay £11,800 damages, the other 40%, but Coleraine Rural Council, also a defendant, was found not to have been negligent.

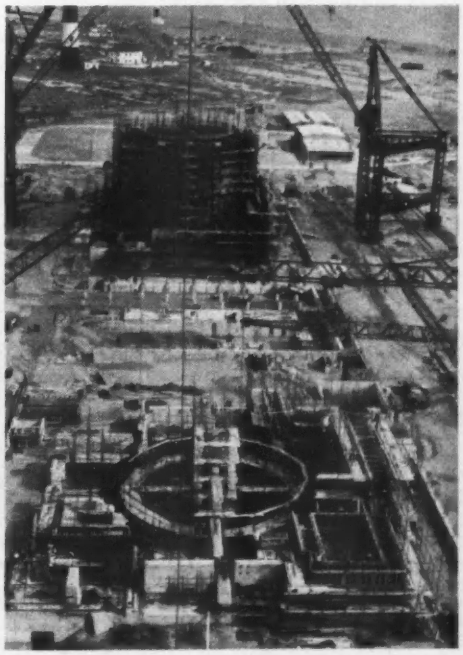
NEW LABORATORY AT HONG KONG UNIVERSITY

THE University of Hong Kong has a new electrical laboratory, the equipment of which has been provided by leading BEAMA manufacturers. The opening ceremony was performed last week by Mr F. Erroll, then Minister of State, Board of Trade. The original equipment, supplied by BEAMA member firms over 40 years ago, was stripped during the Japanese occupation, and lack of finance prevented the re-establishment of the University's technical courses in electrical engineering. But, in 1959, an appeal for help was again made to BEAMA, as a result of which a number of leading British electrical manufacturers, supported by associates in Hong Kong, donated the new machinery and equipment required.

Electricity in Aircraft Control

AROUND 30 to 40 papers will be delivered at a conference on "The Importance of Electricity in the Control of Aircraft," which will take place in London from 26 Feb. to 28 Feb. next. The conference has been organised by a joint committee of the IEE and the Royal Aeronautical Society which was formed last year to promote combined discussions. A number of discussions have already been held and the emphasis this time will be on system design, both in relation to present and future aircraft, and the methods of achieving the required reliability.

Progress at Dungeness



Fourteen months' progress on the 550 MW nuclear power station under construction for the CEGB by The Nuclear Power Group at Dungeness. A view from the Goliath crane showing foundations for the control room and progress on the reactor biological shields. No. 1 is 80% completed and No. 2 is above ground level. The 400-ton Goliath is ready for testing and its first lifts, the bottom dome and crown of No. 1 pressure vessel, are 60% complete. Work has commenced on the first three boilers, and is progressing on the cooling water system and on the turbine house

C.E.G.B'S EFFECT ON EXPORTS

Large sets no detriment, decide B.E.A.M.A. conference

WHETHER the size of sets now being ordered by the CEGB will reduce British manufacturers' competitiveness in obtaining orders for smaller sets overseas, and whether the Board's quality requirements are too high in relation to exports were the two most controversial points touched on at the BEAMA golden jubilee export conference last Thursday. Other questions raised were national planning, the Common Market, and over-publicity of teething troubles.

On the first point, Mr F. H. S. Brown, deputy chairman of the CEGB, took the view that even if the Board were to order nothing less than 500 MW sets the competitiveness of UK manufacturers in supplying 60 MW to 200 MW sets abroad would not be impaired because of their recent experience. This view was supported from the manufacturing side in the discussion which followed his talk outlining the technical achievements which had been a corollary of the growth in demand for electricity and the creation of the largest integrated system in the world as a result of nationalisation. In any event, said Mr Brown, there was no prospect whatever of the Board buying smaller machines in order to support overseas sales.

The question of quality was raised by Mr E. B. Banks of EE who said that in the case of switchgear there was a feeling that the requirements of the CEGB and the area boards were more exacting than those of Continental competitors. Perhaps when new specifications were being drawn up, a joint solution could be worked out by the supply industry and manufacturers. Mr Brown agreed that switchgear design tended to be stagnant and there was scope for improvement, but taking plant generally there was no question of lowering standards in the interests of foreign markets.

The need for a national plan ran through the day's discussions, as did the implications of the Common Market. "Stop-go" policies were slated and the loss of orders due to high interest rates thrown up, but at the conference luncheon Mr R. Maudling, then President of the BoT, was ready for critics. Adjustments were inevitable in a country which had inadequate reserves yet was determined to run at 99% of full output. "I thought this was a concept which engineers would understand quite well," was his cryptic comment. More planning is needed, it was agreed, but, as one speaker pointed out, there is no plan at all for railways, even though less than 10% are electrified.

The East versus West aspect of the Common Market was mentioned by Sir William McFadzean, and this theme was taken further from the conference chair by Mr L. H. Short, chairman of the BEAMA export panel, who said that after visiting Moscow this year he felt that the Russians were not going to change their way of thinking in 100 years, and as we did not want to change our ways the non-trade aspect was of great importance. In his address on "Exporting to Europe," Sir William elaborated on the work of the Export Council for Europe, of which he is chairman, and was able to point out that exports to the area had risen by 14% for the first eight months of this year.

The final talk for the day, "Exporting to the Western Hemisphere," dealt mainly with South America, the speaker being Mr W. J. M. Longmore, leader of the Latin American Division of the Western Hemisphere Export Council. The main points were that spade work should be done as soon as possible if one wanted to be in the market in the next decade and that local manufacture would have to be taken on sooner than UK firms would like. Political stability, while not all it might be, was greater than ever before.

SECOND DAY

On the second day the 300 delegates split up into five discussion groups dealing with the changing pattern of trade, publicity, market research, standards and design, and finance. A recurrent theme with regard to publicity and exporting generally was co-operation, one suggestion being that larger firms might help smaller ones by marketing their products.

The Common Market cropped up again in the discussions on both standards and finance, with Mr H. A. R. Binney, of the BSI, pointing out that steps had been taken to ensure the opportunity for Britain to join in discussions on the harmonisation of standards for the Six, and Mr L. J. Menzies, of the ECGD, saying that the department would be ready to meet demands for cover on joint contracts with continental manufacturers if the time came.

A Crompton "Modulume" ceiling, embodying 50 5 ft 80 W fluorescent tubes, supplemented by spotlights, provide excellent display lighting at the showrooms of Earle of Chippenham Ltd. Electrical installation was by Hickmans of Swindon

Better sound in the Commons

BY the time Parliament resumes on 17 Oct. a new microphone network will have been installed. The work, which involves replacing the 15 existing microphones with 23 microphones of an improved pattern, is being carried out by the Ministry of Works in conjunction with Tannoy Rentals, who supplied both the old and new equipment. Four lines of five microphones are being placed down the centre of the chamber as well as one microphone over the Speaker's chair and two over the despatch boxes.

OFFICIAL PUBLICATIONS

Government Buying of Engineering Goods. OEEC report (see p. 544).

BS 3399. Transformers for Use on Ships. 15s.

BS 3401. Beryllium Copper Crinkle Washers. 3s.

BS 2048. Dimensions of F.H.P. Motors. Part 1. Motors for General Use. 5s.

BS 3412. Low Density Polythene Materials for Moulding and Extrusion. 4s 6d.

ERA Publication:
A Method Based on Maxwell's Equations for Calculating the Axial Short-circuit Forces in the Concentric Windings of an Idealised Transformer, P. R. Vein. 15s.

Photometric Standards and the Unit of Light, J. S. Preston. DSIR Notes on Applied Science No. 24. HMSO. 3s.

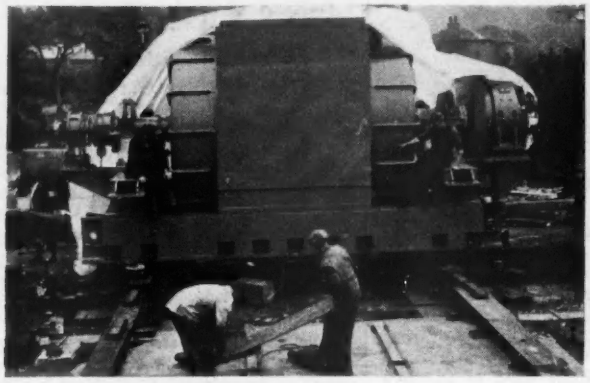
Western Isles Power Costs

THE estimated cost of supplying North Lewis, Bernera, Baleshare and Grimsay with electricity would be £480,000 for a possible 755 consumers (£635/consumer). Estimated cost to supply 622 consumers in Barra and Watersay would be £323,000 (£520/consumer). This information has been given to Mr M. K. Macmillan, MP for the Western Isles, by the Secretary of State for Scotland, Mr Maclay. The latter adds that the estimated date for connecting up these islands must await the Government's consideration of the Mackenzie Committee's recommendations.

But the reply has been criticised by the Western Isles Committee of the Labour Party, who maintain that islanders are leaving through lack of employment as the result of no electricity supplies.

R.I. Christmas lectures

A SERIES of six lectures on "Electricity," adapted to a juvenile auditory, will be given by Sir Lawrence Bragg as part of the Royal Institution's Christmas lectures. Intended for sixth form boys and girls from schools in London and the Home Counties, they will be presented at 3 p.m. each day on 28 Dec. and 30 Dec., 2 Jan., 4 Jan., 6 Jan. and 9 Jan. Subscription for non-members is £1 for children and £2 for adults.



The first of two 40 MVA, 1,000 r.p.m. AEI synchronous condensers for the Iver substation, Southern Div., CEGB, being moved into position. Designed for outdoor installation, it will be used for p.f. correction and voltage regulation on the supergrid, and is claimed to be the first of such size to be installed in this country

I.E.S. AND THE COMMUNITY

PAST work of the Illuminating Engineering Society had exerted a powerful influence in the growth and prosperity of the lighting industry, said Mr W. T. Souter, presenting his inaugural address as president on Tuesday. Given the necessary support, this would continue. Mr Souter was speaking on "The Society's Contribution to Lighting Technology."

First signs of the Society's influence appeared as long ago as 1912, only three years after its formation. In that year a Home Office committee was appointed to investigate lighting conditions in factories and workshops, largely as a result of representations by members of the Society. Only a few years later, the IES was asked by the LCC to undertake an investigation into possible causes of eyestrain in cinemas. The results of the investigation were the basis of recommendations accepted by cinema licensing authorities throughout the country.

During the years of both world wars, the IES rendered valuable services. In 1939-45, committees of the Society carried out a number of investigations for the Government in connection with wartime lighting. It became involved in the relighting of factories when, perhaps for the first time, lighting was recognised as an essential tool in obtaining greater productivity.

This work apart, there has been continued attention to the IES code of good lighting, which finds acceptance not only in the UK but in many other countries as well. The latest edition of the code, with its attention to glare has, in Mr Souter's words, "been hailed all over the world as a major breakthrough in lighting technique."

As the present trend to higher illumination levels continues, so will problems of quality control in lighting increase. Reflected glare, for example, is already troublesome, and is being studied by an IES technical committee. The wider problem of general brightness patterns is also under investigation. Close co-operation with developments in other building services is necessary for the lighting engineer, and the IES technical committee is well aware of the need to promote discussion and exchange of ideas with other specialists.

The Absent Salesman

GERMAN salesmen outnumbered their British counterparts by 20-to-1 on the Continent, Sir William McFadzean mentioned at the BEAMA export conference. Nor is this surprising in view of the results of a survey recently conducted by the London School of Marketing. These show that only one company in seven makes regular visits to customers abroad, and even among firms employing more than 2,000 the average is only one in four.

By way of filling the gap, the school has arranged for teams of experts from overseas markets to visit London and advise British businessmen on how best to sell in their respective countries. The first group are French and will begin a course of lectures on 30 Oct.

Liverpool to End Account Collecting for M.A.N.W.E.B.

A COMMISSION of 0·8% on a total collection of nearly £500,000 is inadequate, in the view of Liverpool City Council. So they have decided to end their agreement with the Merseyside and North Wales Electricity Board, by which Council tenants paid their electricity bills weekly to Corporation collectors. An effort by Councillor H. Evans, who is also chairman of the area Electricity Consultative Council, to refer the matter back for reconsideration was unsuccessful.

The matter arose on an application by MANWEB to vary the basis upon which the Board made payment to the Corporation for collecting accounts. The town clerk and city treasurer reported on those proposals, following which the Corporation resolved that they would continue the service provided MANWEB accepted a formula on the lines suggested by the city treasurer, otherwise the present arrangements would be discontinued from 31 March next. The decision will affect about 29,500 tenants.

Motors for Embassies

BROOK Motors Ltd. have provided electric motors for two important embassies—the new American Embassy in Grosvenor Sq, London, and the new British Embassy office building in Washington, DC. In both installations the motors provide the power for the heating and ventilating systems. In the American Embassy there is a total of 69 motors on the air-conditioning plant, ranging from ¼ h.p. to 15 h.p. In the British Embassy building in Washington, eight motors have been installed, the largest being a 75 h.p. machine. On water circulation pumps 4 drip proof motors are used, two of 10 h.p. and two of 5 h.p.

SCOTTISH TRAINING SCHEME PROGRESS

IN view of the need for a proportion of graduates to carry their academic education beyond the degree course, the Scottish Electrical Training Scheme is planning to start, in a year's time, a course of combined academic and industrially based tutorial training in advanced maths, advanced science and, later, advanced electrical engineering in specialist subjects. This news was given by Mr J. E. C. McCandlish, organising secretary of SETS, at the annual conference in Edinburgh recently. These courses would be voluntary and progressive, with SETS arranging the lectures. As the first step, applications had been approved for 11 graduates to attend the advanced technical maths course at Heriot-Watt College this winter, he said.

This year, SETS had an intake of 21 graduates. 106 men had been given vacation training, again a highest-ever figure, and there were 18 pre-college trainees. Two member firms of the scheme had also increased their annual requirement of graduates, an indication of their confidence in the scheme.

It had also been decided to offer one vacancy annually for graduate training to an overseas student who is in the UK for University or equivalent education, and intends to return to his own country.

Earlier, at the luncheon, the chairman of the board of SETS, Mr J. S. Hastie, works director of Scottish Cables Ltd., referred to the remarkable growth in the scheme in its five years of existence, and welcomed Prof J. Lamb, now Professor of electrical engineering at Glasgow University, who had become an advisory director to SETS.

As on previous occasions, the conference took the form of a visit to the works of Bruce Peebles and Co.

COMPUTERS IN SUPPLY AND MANUFACTURING

USE of electronic computers in the scientific and design side of the electrical industry has been widely reported. At the Electronic Data Processing Symposium, held last week in connection with the Electronic Computer Exhibition, the advantages in business operations were considered, with reports from firms such as AEI-Hotpoint and AEI Lamp and Lighting, and from the Midlands EB, amongst the examples of successful applications.

AEI Lamp and Lighting plan to handle finished stock control, production monitoring, sales invoicing and accounting by computer next year. Advantages expected include faster processing of sales documents and statistical reports, and the availability of a perpetual inventory, besides a saving in clerical costs. Success of the scheme will be followed through by use of computer methods for production control.

Mr W. J. Kease, of AEI-Hotpoint, related his firm's plans for integrated production control using a computer, to what he called the "wild fluctuations" of the domestic appliance market. While growth of the market seemed assured, fluctuations in level of sales were bound to continue. Computer systems were able to provide economically the high-speed reference, calculation and inter-relation facilities that the conditions of the industry demanded.

The MEB sample survey of domestic consumers, carried out in 1960, was carried out on a contract basis by a computer bureau. Mr H. Wormald described to the symposium the Board's plans to keep in being the sample of 12,000 households used, by adding a proportion of new premises from time to time and subtracting demolished and converted premises. It is now intended to repeat the survey every five years. About 60 items are entered on the survey sheet and are processed by the computer.

As well as these specific electrical applications, there were reports of a wide range of other uses in industry and commerce and Government service. In opening the symposium, Sir Edward Boyle, M.P., remarked that application of computers had not spread so rapidly in the UK as in some other parts of the world. Success of computers depended on their efficiency and, thus, on their economic use and reliability.

River Board Reject Kincardine Plea

A CLASH over water temperature in the Forth River near Kincardine station has developed between South of Scotland EB and the Forth River Purification Board. The electricity board have objected to the river board's stipulation that temperature in the river within a quarter of a mile of the station must not exceed 75°F, but the river board have refused to alter the condition.

Cliff Quay-Sundon 400 kV Line

OPPOSITION is mounting against a proposal of the CEGB to erect a 400 kV line from Cliff Quay, Ipswich, to Sundon. The line proposed would run parallel with and some 200 yd from the existing Cliff Quay-Sundon 132 kV line. Objections have to be lodged by 13 Oct. Certain prominent residents across whose land the line would cross have already expressed opposition.

Govt. Buying Methods in 15 Countries

PARTICULARLY useful to electrical exporters, once available, is a booklet just printed by the Organisation for European Economic Co-operation in Brussels setting out the tendering procedure adopted by governmental authorities in most West European countries and the USA when buying engineering products. The UK is included and, among continental countries in the Western bloc, only Spain and Greece are omitted.

The information stems from a survey by OEEC's machinery committee to see how far the rules of government buying in each country allow foreign suppliers to obtain contracts for engineering products. After considering the results, the Organisation's steering board for trade decided that "interested circles" should have access to the information, though as yet the booklet is not obtainable from HM Stationery Office and no price or method of distribution is mentioned with our review copy. The booklet is entitled *Government Buying of Engineering Goods*.

None of the countries surveyed exclude foreign tenders, the booklet shows, but there is a varying degree of favouritism for local manufacturers. Except in the USA this is implicit rather than tied down by regulations, though in the case of the Netherlands, Portugal and Switzerland local domicile is necessary and, in Italy, registration is virtually essential. In the USA there are the well-known provisions of the Buy American Act.

NEW CHIEF FOR I.A.E.A.

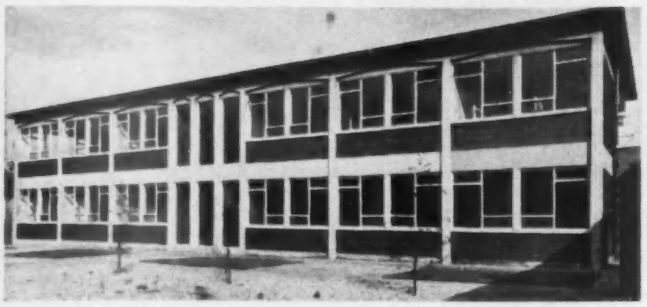
AFTER a lengthy debate showing a split on conventional international political lines, the International Atomic Energy Agency last week confirmed the appointment of a Swede, Dr S. Eklund, as director-general in succession to Mr Sterling Cole of the USA. The IAEA was holding its annual general conference in Vienna, where the British representative was Sir Roger Makins, chairman of the UKAEA. The IAEA is concerned with organisation of conferences on nuclear subjects, and with giving help to less developed countries in developing peaceful applications of nuclear energy.

Speaking in the general debate, Sir Roger Makins urged that an effort should be made to reduce the number of international scientific meetings, lest the quality of results suffer. He also announced that the UK Government were preparing national regulations based on IAEA recommendations regarding the transport of radioactive materials.

Sir Roger announced that when Berkeley and Bradwell were working, the UK would accept a limited number of IAEA-sponsored scientists and engineers (Fellows) on appointments of up to two years. Noting that the UK had so far provided ten of the "experts" appointed to the staff of the IAEA, he said that in future it might be necessary to appoint such experts for shorter terms.

Dr Eklund, who will take office in December, was secretary-general of the 1958 Atomic Energy Conference at Geneva. His predecessor, delivering his last address to the general conference, called for a change in the method of financing the work of the Agency, since the present dependence on voluntary contributions from member countries made long-term planning impossible.

ROTUNDA'S NEW HEAD OFFICE



Rear view of new 10,000 sq ft offices at Denton, Lancs., of Rotunda Ltd., a member of the BICC group. They have "Panelec" floor-warming. H. Bailey & Co., Denton, were the electrical contractors

For the Design-conscious

SWEDEN'S international influence in elegant design is further in evidence at an exhibition of Swedish Design Awards, instituted by Svensk Form of Stockholm, officially opened at the Design Centre in London last Thursday. The exhibition, the first to be held at the Centre devoted exclusively to the showing of foreign products, offers an impressive display of contemporary styled artistries, including a distinctively styled pendant lighting fitting from Orrefors, and a plastics dome-shaped lamp which can be adjusted to any height.

Plastics, which is well represented amid the glitter of more refulgent surroundings, can be seen in the form of an aesthetically pleasing shade for ceiling lighting and a push-button receiverless telephone by Ericsson. Already well established in this country, Electro-Helios have won pride of place with a dual boiling ring table cooker with drop down oven door. Other items of interest, on view until 4 Nov., include a pneumatic hand drill from Atlas Copco, and a circular shaped three-way junction box.

Pole-top Death

A MAN who attempted to steal cable from a live 11 kV line near Leeds died from severe burns in Leeds Infirmary. His brother and another man who were nearby at the time of the accident were committed for trial, accused of attempting to steal the cable, at Leeds West Riding Magistrates' Court, recently. The incident happened at an open-cast coal site on the Leeds-Barnsdale Rd, Kippax. It was stated that the deceased climbed a pole intending to cut the cable with a hacksaw, to be thrown to him by the other men. But the hacksaw landed in some nettles and, while they were finding it, the two men saw flashes and heard a moan from the man up the top of the pole, who fell to the ground severely burned.

Sayings OF THE WEEK

"What interests me most about the possibility of a thinking machine is whether or not we shall one day be able to evolve machines which are capable of communicating one with another." . . . SIR EDWARD BOYLE at the Electronic Data Processing symposium.

"It is possible that the next 50 years will see developments in the power field as spectacular as the past 50 years in electronics." . . . MR G. S. C. LUCAS, in his inaugural address as IEE president.

"It has often struck me that as the lamp designer brings out more efficient lamps, the lamp-shade manufacturer manages to bring out designs of shade that will absorb a lot of light in the name of contemporary art." . . . MR R. N. PEGG, chairman's address to Merseyside and N. Wales Centre, IEE.

PRICES of cable metals and other materials

Figures quoted are the official prices ruling on Tuesday, October 10

	£ per ton	Weekly change £
COPPER, standard class A (settlement)	227	+4½
" (3 months)	227⅜	+1¾
LEAD, refined pig, 99·97% purity (cash)	63½	+⅜
" (3 months)	64⅛	+¼
TIN, refined, min. 99·75% purity (settlement)	949	+5
(3 months)	958½	+3½
ALUMINIUM, ingots 99·99·5%	186	—
" wire bars (4×4×54")	193½	—
BRASS Strip 63/37	195	+4½
SILVER (Troy oz)	79¾d	—
ZINC, virgin, min. 98% purity (cash)	71½	−1¼
" (3 months)	72¾	−¾
RUBBER, per lb No. 1, RSS, spot	24½d	−⅛d
c.i.f. basis, ports, Dec.	24½d	−⅛d
ARMOURING: Galv. Steel Wire (0·104 in.)	68½	—
Mild Steel Tape (0·04 in.)	53¼*	—
NICKEL (home)	660	—
MERCURY (76 lb flask)	62	—
AMERICAN PRICES: Copper, electrolytic (per lb)	31c	—
Lead (New York)	11c	—

* *Tape Price, now an average, includes varnishing*

EXTENSION TO BROOME PARK

THE bold step of erecting a £30,000 extension to their home for old people in Surrey has been undertaken by the Electrical Industries' Benevolent Association. The addition will provide bed-sitting rooms for another 15 residents, and already £2,000 each has been offered by the Electricity Council, BEAMA and the Electrical Wholesalers' Federation. Other improvements will be a much-needed lift, which is being donated by a well-known individual benefactor, extra bathrooms, an improved billiard room and a conservatory. Readiness to help has already been shown by many other people, and EIBA hope that further financial support will be forthcoming.

The impact of a runaway 8-ton lorry halted building progress for a time, but the roof will soon be on the new wing, which is of a modern design that blends well with the existing Georgian building. The average age of the residents is over 80, but since the home opened in 1948 none there has suffered a lingering last illness.

Electrical Industries' Golf

AT the annual championship meeting of the Electrical Industries' National Golf Competition on 2 Oct., Mr D. B. Samuel won the Sir Montague Hughman trophy with Mr F. Stanley, Mr B. Rolfe and Mr E. H. Tye tying for second place. Mr B. Rolfe won the J. Y. Fletcher cup for the best scratch score (74). Winners of the Sir Felix Pole Foursomes Trophies were Messrs B. Rolfe and D. B. Samuel.

At the Hillside Golf Club, the Visitors' Trophy, presented by the EWF, was won by Mr G. Auton, with Mr L. Bowen runner-up. Winner of the Veterans' Trophy was Mr E. L. Pollard, with Mr S. Howgate runner-up.

At the annual dinner it was announced that the total collected by the golfing fraternity of the industry was £3,800 for the year.

AIRCRAFT SUPPLIES

IN connection with the article "System Testing for Aircraft" (p. 452, 28 Sept.), we have been asked to point out that English Electric equipment giving constant frequency supplies is used on production versions of the Victor and Vulcan bombers in squadron service.

News in Brief

South Western Electricity Board are considering use of helicopters for pole erection on the Widecombe scheme.

Annual dinner of the Lightmongers will be held in the Livery Hall at the Guildhall, London, on 7 Nov., when the new president, Mr C. Dykes-Brown, will be installed.

The Swedish State Power Board have just issued a new brochure on power supply in that country, with brief details of all hydro and thermal stations and the main h.v. network.

By the casting vote of Provost W. Moir, Prestwick TC have decided to take no action on a plan to rent refrigerators to council house tenants. Of the latter, 279 had indicated interest.

The Tin Research Institute has translated its "Notes on Soldering" booklet in Spanish, and copies are now available, gratis.

The AEI film "Electron Microscopy" gained a certificate of merit at the congress of the International Scientific Film Association.

The BBC's new VHF sound broadcasting station at Londonderry will be put in service on 23 Oct.

The Tennessee Valley Authority have ordered two digital computers from TRW Computers Co., each to control a 650 MW generating set at Paradise power station, Drakesboro, Kentucky.

No. 2 reactor at Berkeley nuclear power station recently underwent full pressure testing.

An order for 2,000 6-volt bus batteries for use in Argentina has been received by Chloride Batteries Ltd. The order comes from AEC who are supplying 500 bus chassis to Argentina.

Company Activities

BANK Rate down from 7% to 6½%. It is not much, but even a "clipping" of this size means money in the machine some 7% cheaper and although the Chancellor at the Bankers' Dinner made it clear that the wages pause and other restrictions are to be relentlessly adhered to, stock markets were only too pleased to seize the occasion to haul themselves back over the 300 line, measured by the *Financial Times* equity index, after they had earlier in the week plumbed a new 1961 "low" of 292·9. The market, however, was already showing signs of fight-back before the Bank Rate decision. The further rise in the September gold reserves, sterling at a new peak for the year against the US dollar, yet another increase in machine tool order books in July, and the optimistic forecast by the National Institute Economic Review that the country's overall balance of payments may again show a surplus in the first half of 1962 were all positive factors working in favour of at least some moderate recovery in markets before the Bank Rate move.

No investor who knows his markets, however, will now choose to throw caution to the wind and embark upon any programme of indiscriminate buying. It is true that a number of equities now look cheap, probably are cheap at that, but the nation is still far, far from being out of the economic wood. Our balance of payments is still in deficit: improvement in our international trade balance, it is true to say, stems from lower imports rather than from any rapid acceleration in vital exports. Competition and costs are increasingly eating into industrial profit margins; there are discernible signs that the capital investment boom is not going on *ad infinitum* and credit at 6½% plus—if obtainable—is still dear. Further, the General and Municipal Workers' Union and the Transport and General Workers' Union are spoiling for a fight with the Chancellor over the wages pause. There will be jolts aplenty for the market before it once more attains anything like the year's index "high" of 365·7, so that equity investment at the moment is best left to the professionals and to those members of the public who are prepared to buy reasonably cheaply now but who are also prepared to hold on to their stock for at least a couple of years on the not absent prospects for recovery.

The electrical market last week could find little inspiration until the Bank Rate decision. Then it displayed a degree more of enthusiasm. British Electronic Industries rose from 10s 9d to 11s 3d, Chloride "A", which started out at 75s and had faded to 73s, rallied to 75s 6d and Thorn Electrical after 54s 9d closed 2s 3d dearer over the week at 57s 6d. Other bright spots included Dimplex up from 85s 6d to 86s 9d, Elliott-Automation which may have attracted buyers on the Computer Show closed at 35s 3d after 32s 10½d and EMI, too, was calculated 2s 6d dearer over the week at 38s 6d. Biggest in the European computer industry, however, ICI fared far less favourably. Its shares started business at 92s 3d, slipped to 88s 9d and then recovered to no more than 91s.

Speculation once more surrounded Hoover. A bid from the US parent for the British end of the business has again been denied, but the appointment over the head of Mr Sidney Roberts of 40-year-old Canadian Mr Arthur Earle was a move sufficiently mysterious to put the 5s Ordinary shares 4s 6d higher over the week to 54s 6d, while the 5s "A" spun up 2s 6d to 44s 9d.

Elsewhere, Plessey surged up from 38s to 41s 4½d on the profits forecast in the proposed merger of Plessey, ATE and Ericsson, and the latter's 5s Ordinary improved 3s 4½d in the week to 31s 3d.

But the "big boys" of the electrical business were still dozing under the various atomic, domestic appliance and heavy generating clouds. AEI were bought 1s cheaper at 30s 3d by the end of Bank Rate week, GEC were 6d off at 25s 9d and English Electric switched back from 27s 6d to 27s 3d.—*From our City Correspondent.*

AEI

Apparently, some market observers have taken Lord Chandos's warning that the dividend would not necessarily be maintained this year to mean that losses on Berkeley nuclear station were greater than expected. In answer to a Press report, AEI have announced that there is no reason to believe that their share of the losses will exceed the amount covered by the 1959 provision, and they do not expect to have to make further provision out of current income. After taking tax relief into account, the 1959 provision is sufficient to cover about £1¾ million, they point out.

Barton and Sons

Interim dividend is 6%, which is effectively the same as last year's 7½% before a one-for-four scrip issue. With the year three-quarters over, directors expect profit to be satisfactory but not up to last year's record.

Berry Trust

Not surprising, since the principal asset is shares in Berry's Electric Magicoal, profit and dividend exceed forecasts. Profit before tax for the year to 31 Aug. is £47,323 against the £41,000 forecast in December and the £34,000 envisaged a year ago. Dividend is edged up from 33⅓% to 35% and would have been higher but for the Chancellor's "pause." Earnings were 40·3% and retained profits will be distributed later.

Cape Electric Tramways

Group net profit is up from R700,850 to R825,336, but there is a provision of R50,582 for loss to be incurred on liquidation of a subsidiary. Dividend is 8% against an equivalent 6⅔% previously.

English Electric

Market purchases, instead of drawings, have been chosen this year as the means for reducing the £7 million of 6% 1980-85 debenture stock issued last year. In accordance with the trust deed, the company has purchased stock to a nominal value of £66,179, reducing the outstanding issue to £6,933,821.

Eveready South Africa

Following record profit for the year to June, sales since then have been at a higher level than in the previous corresponding period. The demand for transistor radio batteries is still increasing rapidly, the chairman reports.

Holophane

Net profit is steady at £55,146 (£54,477) after tax of £56,600 (£51,300) and dividend stays at 30%.

Oliver Pell Control

A profit of £28,209 for the year to 31 March contrasts with a £14,239 loss previously. Dividend stays at 6%. Tax charge is £6,030 (previously £2,829 credit) and carry forward is £115,218 (*£91,081*).

Perak River Hydro

Profit before tax increased from £532,686 to £764,295 in the year to 31 July and dividend stays at 15%. Tax takes £356,955 (*£237,635*).

Romac Industries

Cable division continues to expand, the chairman said at the a.g.m. He expects the group to at least hold its own this year.

George H. Scholes

Increased sales, coupled with the absorption of higher costs of production through improved methods, are behind the past year's record profit. While it is in deference to the Chancellor's pause that dividend is being held at 27½%, as the chairman discloses in his annual report, plans are going ahead for a one-for-five scrip issue.

Year to 30 June	£ Trading Profit	£ Profit Net	% on Ord. Earned	% on Ord. Paid	Ord. Price* High	Ord. Price* Low
1957	259,020	101,722	80.3	25	10/11	10/6½
1958	303,825	118,567	69.1†	25†	19/6	11/3
1959	378,228	165,125	90.6	30	36/-	13/4
1960	460,429	201,746	73.8‡	27½‡	35/1½	33/6
1961	523,419	213,514	78.1	27½	38/-	35/6

* Calendar year, except 1961 which is up to 15 June.
† After two-for-five scrip issue. ‡ After one-for-two scrip issue.

Dividend Announced

Marconi International Marine Communication. Interim 2½% (*same*).

OVERSEAS NEWS

from our correspondents abroad

CANADA

Change to Coal

A revival of the Alberta coal mining industry is imminent with the conversion of the Wabamun steam generating plant of Calgary Power Ltd. from natural gas to coal burning. Location of the thermal plant, west of Edmonton, near the shore of Lake Wabamun, is on top of one of the largest deposits of lignite coal in the province, with one of the shallowest depths of overburden. It has been known for some time that the plant would be switched to coal in the foreseeable future, but the date has now been set for the first time as 1962. The coal beds will be strip-mined at the rate of about 60.000 tons per month. The conversion will materially reduce the production of gas from the Fort Saskatchewan field and other gas fields in the area north and west of Edmonton.

Heating Rate Cut

As a further incentive to use electric heating, the Hydro-Electric Power Commission, of Ontario, has announced a 10% reduction in the minimum rate for electricity consumption for that purpose —cutting the price from 1·5 cents/unit to 1·35 cents/unit. Announcing the change the chairman, Mr W. Ross Strike, said the commission expects that the 2,000 all-electric home installations in Ontario by the end of 1961 will double next year, and continue to increase rapidly from year to year to perhaps a quarter of a million by 1980. Although Ontario Hydro has only promoted electric heating for the past two years, the rate of growth is said to compare favourably with other systems in North America.

Petition Dismissed

The British Columbia Government is not likely to approve the Petition of Right recently lodged by the BC Power Corporation in its struggle for an improvement in the takeover compensation. This news has been given by the Premier, Mr W. A. C. Bennett, last week, and it seems that the Corporation is unable to alter that course of action.

GHANA

Volta Tenders

Exceptionally low Japanese tender prices for the supply of water turbines and governors figure in the bid for plant for Ghana's Volta River project which were opened last week. There are quotations of £919,000 from Hitachi; £938,000 from Mitsui; and £1,236,000 from Mitsubishi, while bids from other concerns range up to £1,852,000. A qualified tender from the English Electric Co. quoted a price of £1,528,000, and the Dominion Engineering Co., of Canada, set a figure of £1,337,000. For the supply of generators and transformers, the tender price of English Electric Co. was £2,126,000. The widest variation is shown in tenders for the construction of main transmission lines. The lowest, of £1,970,000, was submitted by Productions Ltd., while BICC quoted £3,133,000, and AEI £5,607,000. The tenders are now being evaluated, and it will be some months before a decision is made. Meanwhile, the Ghana Government is seeking clarification of the position concerning a promised US loan.

MAURITIUS

Diesel Sets

To provide quick additional generating capacity, the Central Electricity Board of Mauritius has ordered two diesel sets worth about £750,000 from the Italian firm of Fiat Stabilimento Grandi Motori. They are to be installed in a new 40 MW station in the Port Louis harbour area.

S. AFRICA

Orange River Scheme

There are now indications that the Government of South Africa will soon announce its plans for a multi-purpose project on the Orange River. According to reports this will involve hydro-electric plant, possibly of 1,000 MW, in addition to water supply lines and irrigation for a wide area. The dam to be built would be near Bethulie, in Orange Free State, it is now suggested, instead of one of two other proposed sites further upstream.

Local Production

The first tractor motor with a locally manufactured field assembly is expected to go into service with the South African Railways next month. This development has been undertaken by the First Electric Corporation, aided by AEI of Britain who have sent out technicians from their Sheffield works. First Electric Corporation are providing the electrical equipment for 113 motor coaches ordered by the railways from Union Carriage and Wagon Co., and these are now being supplied with a steadily increasing proportion of locally made equipment. Towards the end of the programme First Electric Corporation will be manufacturing the rotating armatures, and will then be in a position to supply complete traction motors of South African manufacture. The experience gained is expected to be invaluable when quoting against future inquiries for the South African Railways.

INDIA

State Supergrid

Plans are being prepared for a supergrid network for part of India. The Minister for Electricity, Mr V. Ramaiah, recently stated that as a preliminary step it had been decided that provision might be made in the third Five-Year Plan for the construction of four 230 kV double-circuit lines for linking certain important substations in the Southern zone and Mysore. The lines would, however, be single-circuit lines initially, and be changed to double-circuit as development required.

AUSTRALIA

Sydney's Deficit

With a 10·8% increase in units sold (to 2,953 million) the Sydney County Council electricity undertaking had a revenue deficit of £354,758 on trading for the year ended 31 Dec. last. This, despite an increase in commercial and industrial tariffs, operative from 31 March, 1960, which were estimated to provide additional income of £1 million/annum. The undertaking, of course, takes a bulk supply from the Electricity Commission of NSW, and the Joint Planning Committee of the two organisations recently agreed that a new 240 MVA 132/33 kV substation should be established at Darlinghurst by 1967 to relieve the load on Bunnerong supply point. Plans have also been prepared for the development of the h.v. feeder network in 17 of the 40 zones into which the Council's distribution system is divided.

Two 60 MW Sets

The State Electricity Commission of Western Australia has ordered two 60 MW steam turbo-generators, with condensing and feed heating plant, for its new Muja power station, from C. A. Parsons and Co. Ltd. The station will be situated on an open-cast coalfield near Collie. Of two-cylinder design, the turbines will operate with steam conditions of 900 lb/sq in. pressure and 900°F temperature. All the condensing and feed heating plant will be made at Parsons' Whyalla Works, South Australia.

JAPAN

Plant Merger

Two firms who previously collaborated, Ishikawajima-Shibaura Turbine Co., and the Tokyo Shibaura Co. (Toshiba) have now merged. The latter used to make the main body for thermal generators and the former made the turbine. Now, as a joint concern, they can make the whole machine. There are plans to build a new 970,000 sq ft plant at Tsurumi.

COMMERCIAL INFORMATION

Contracts Open at Home . . .

Dates given are the final for receipt of tenders unless otherwise stated.

12 Oct.—King's Lynn B.C. Contract 2. Electrical installation, renewals and additions in 90 houses, Fermoy, Raby, Smith and Metcalfe avenues. Borough Engineer: R. H. Ridler, 17 Queen St.

13 Oct.—Cardiff C.C. Erection of 1,180 Class "B" concrete columns complete with mercury fluorescent lanterns/gear on fixed-price basis.—See 28 Sept. issue.

13 Oct.—Crediton R.D.C. (1) Wiring of eight houses, 5-10 East End and 1-2 Oxford Sq, Poughill, and provision of washboilers. (2) Wiring and other modernisation work in eight houses, 1-4 East and West End, plus provision of washboilers.—See 28 Sept. issue.

14 Oct.—Kenilworth U.D.C. Duplicate sewage pumps at Mill End.—See 5 Oct. issue.

16 Oct.—Cardiff C.C. Electrical installation in Splott Pk Clinic. N.I.C. firms only.—See 28 Sept. issue.

16 Oct.—Down C.C. Electrical and lift installations in new H.Q. offices at 18 Windsor Ave, Belfast.—See 21 Sept. issue.

16 Oct.—Durham C.C. 20 400 W mercury lighting on 25 ft steel columns at A177 roundabout near new County Hall.—See 28 Sept. issue.

16 Oct.—Forth Rd Bridge Joint Board. Heating of road in toll booth area of Southern Approach near Hopetoun cross-roads.—See 28 Sept. issue.

16 Oct.—Frimley and Camberley U.D.C. Provision of electrical points and installation/testing only of 600 refrigerators. Engineer and Surveyor, London Rd.

16 Oct.—N. Riding C.C. Lighting of A174 roundabout at Ormesby. — Advertised 21 Sept. issue.

16 Oct.—Preston C.B.C. Readvertisement: Electrical installations, on fixed-price basis, in eight shops, 13 maisonnettes and branch library on Savick estate. Borough Engineer and Surveyor, Municipal Bldg. Deposit £2 2s.

16 Oct.—Port Talbot B.C. 46 15 ft concrete columns and arms, 46 80 W chokes and condensers, 46 symmetrical type lanterns, 46 80 W mercury lamps, 25 200 W sodium lanterns.—See 5 Oct. issue.

17 Oct.—Dumfries B.C. Electrical installations in 50 houses, Lockside Sixth Development. Applications to Town Clerk: G. D. Grant, Municipal Chmbrs, by above date.

17 Oct.—Middlesbrough C.B.C. Replacement of tungsten with fluorescent lighting at Fire Brigade H.Q., Park Rd South. Borough Engineer. Deposit £1 1s.

18 Oct.—Durham C.C. (e) Electrical installation in Chilton Secondary School. Applications to County Architect, South St, Durham, by above date.

18 Oct.—Farnham U.D.C. Electrical work in Council Offices and "Montrose." Engineer and Surveyor, South St. N.I.C. firms only.

18 Oct.—Penybont R.D.C. 50 100 W mercury fluorescent lamps and 20 60 W sodium lamps on concrete columns.—See 5 Oct. issue.

19 Oct.—Belfast C.C. Electrical installation in Strandtown Primary School, North Rd. City Architect's Dept., 40 Academy St.

20 Oct.—Aberdare U.D.C. Supply and installation of 13 columns/lanterns on Maesgwyn Rd, Cwmdare.—Advertised 28 Sept. issue.

20 Oct.—Chelmsford B.C. Erection, on fixed-price basis, of 50 25 ft steel columns and fixing of 21 fluorescent and 36 140 W sodium lanterns together with ancillary works. Borough Engineer and Surveyor, Municipal Offices, Coval La. Deposit £2 2s.

20 Oct.—Edinburgh C.C. Electrical installation, River Purification Offices.—See 5 Oct. issue.

20 Oct.—Montgomeryshire E.A. Electrical installations in schools, canteens and houses at (a) Clatter; (b) Carno; and (c) Rhiwhiriaeth. Director of Education: J. A. Davies, Newtown.

20 Oct.—Scunthorpe B.C. Rewiring of 226 houses on Crosby estate. N.I.C. firms only. —See 28 Sept. issue.

20 Oct.—S.E. Metropolitan Hospitals. Applications for inclusion in select list for £18,000 electrical installation in Lewisham Hospital extensions to Secretary, 40 Eastbourne Terr, W.2, by above date. Three referees required, including one for finance.

23 Oct.—Down C.C. Electrical heating and lighting installation in Child Health Clinic and Library at Castlewellan.—See 5 Oct. issue.

23 Oct.—Inverkeithing B.C. Electrical work in 58 houses, Roman Rd. Applications to Town Clerk: R. Mitchell, Burgh Chmbrs, by above date.

23 Oct.—Rawtenstall B.C. Supply of (a) 155 140 W sodium lighting units and (b) 155 bracket arms for use with existing steel poles. Borough Engineer and Surveyor, Town Hall, Bacup Rd. Deposit £2 2s.

23 Oct.—West Riding C.C. Electrical installation in Divisional Office, 6 Victoria Rd, Barnsley.—See 28 Sept. issue.

24 Oct.—Neath R.D.C. Supply and erection of 52 steel columns, 19 wood pole brackets and one wall bracket, and 72 200 W sodium lamps/gear/wiring. Engineer and Surveyor's Dept., Council Offices, Orchard St. Deposit £2 2s.

25 Oct.—Manchester C.C. Electrical installation in new abattoir, Philips Pk.—Advertised 28 Sept. issue.

26 Oct.—Stokesley R.D.C. Contract 2. Duplicate air compressor and ejector plant for sewerage scheme.—See 28 Sept. issue.

27 Oct.—Belfast C.C. Specification W.200. Supply of 33/11 kV 7·5 MVA step-down transformers.—Advertised 28 Sept. issue.

27 Oct.—Howden R.D.C. Contract 2. Supply or 160, 200, 260 and 375 g.p.m. duplicate sewage and one 100 g.p.m. sludge pump complete with motors/starters/accessories for Bubwith and Foggathorpe Scheme. Details from consulting engineers: J. H. Haiste and Ptnrs., Belmont Hse, 20 Wood La, Headingley, Leeds. Deposit £3 3s, payable to R.D.C.

27 Oct.—Larne B.C. Electrical installation in Agnew St public conveniences. Town Clerk, Gardenmore Hse.

28 Oct.—Bristol C.C. Supply of: lamps, transformers/capacitors, sundries, cables, etc., for year to 31 Dec., 1962. City Engineer and Planning Officer, Cabot Hse, Deanery Rd.—Advertised in this issue.

30 Oct.—Chesterfield B.C. Supply of: (1) 165 25 ft tubular steel columns and three wall brackets; (2) 157 140 W sodium lanterns and one post-top 140 W sodium lantern; (3) 17 3 x 80 W fluorescent lanterns/lamps/gear, alternatively 17 400 W colour-corrected mercury lanterns/lamps/gear; (4) 158 140 W sodium lamps/gear; (5) erection of columns/brackets and removal of 146 concrete 25 ft columns. Borough Engineer's Office, Town Hall. Deposit £2 2s. —Advertised in this issue.

30 Oct.—Newtownabbey. (3) Electrical engineering services in new school buildings, etc., for Board of Governors of Belfast High School. Details from consulting engineers: Oscar Faber and Ptnrs., 31 College Gdns, Belfast 9. Deposit £3 3s.

30 Oct.—Worsley U.D.C. Supply and installation, on fixed-price basis, of 1,000 g.p.m. at 23 ft head, sewage pumps, etc. Engineer and Surveyor, Town Hall, Walkden, near Manchester.

31 Oct.—Fermanagh C.C. (c) Electrical work in old people's home. Details from consulting engineers: A. K. McAuslan and Ptnrs., 16 Bedford St, Belfast 2. Deposit £5 5s, made payable to Secretary, Fermanagh County Welfare Committee.

1 Nov.—Bournemouth C.B.C. Supply of: (a) electrical industrial truck and charger; (b) electrical street cleansing truck and charger.—See 28 Sept. issue.

1 Nov.—Coleraine. Heating installation in Camus-Juxta-Bann Church, Macosquin. Details from Mr W. J. Bryan, Springwell Forest, Macosquin. Deposit £2.

1 Nov.—Dartford B.C. Supply and erection of 75 25 ft concrete columns and 400 W MBF/U lamps/lamps, together with removal of existing installations along Town Centre approach roads. Town Clerk: T. Armstrong, Council Offices. Deposit £2 2s.

3 Nov.—Bognor Regis U.D.C. Supply and erection of Group "A" and "B" lighting, on fixed-price basis, comprising 196 "Stanton" columns and "G.E.C." lanterns, together with the removal of redundant installations. Engineer and Surveyor, Town Hall. Deposit £2 2s.

3 Nov.—Matlock U.D.C. Provision and erection of 28 Group "A" 140 W sodium lighting on steel columns. Engineer and Surveyor: N. Chamberlain, Town Hall. Deposit £2 2s.—Advertised in this issue.

3 Nov.—Notts C.C. Provision and erection of illuminated motorway type traffic signs

Your Queries Answered

Readers are invited to make use of our free enquiry department which possesses wide resources, including an index of trade information with over 100,000 entries

A Selection from the 107 queries answered this week

"Swirlux" washing machines—address for? S.W.E.B.—Electrical Concessionaires Ltd., Healey Wood Rd, Burnley, Lancs.

"Horbick" pot washing machine—makers of? T.B.—Horsfall and Bickham Ltd., Bridgewater Wks, Orchard St, Salford 6, Lancs.

"Prento" fuse bridges—makers of? E.E.B.—Prentice Ltd., Progress Wks, Gelderd Rd, Leeds 12.

"Stanco" vibratory massagers—makers of? T.E.—Stanley Cox Ltd., Ellis Hse, 11 Aintree Rd, Perivale, Greenford, Middx.

Transformer and Electrical Co. Ltd.—address for? G.E.T.—Honywood Rd, Basildon, Essex.

"Agiflash" photographic equipment—suppliers of? E.W.F.—E. M. Cromwell and Co. Ltd., Galloway Rd, Rye St, Bishop's Stortford, Herts.

"Minipot" blankets—address for? S.E.E.B.—The makers, Minipot Appliances Ltd., are no longer in existence.

"Riviera" fires—address for spares? R.E.—Buchan Cartwright and Co., 2 Bridge Rd, N.W.10.

"Viceroy Twin" combined dish and clothes washing machines—makers of? L.E.B.—V.W. Co. Ltd., High St, Stratford, E.15.

along six miles A1. County Surveyor, Shire Hall, Nottingham. Deposit £2.

6 Nov.—Clowne P.C. Supply of (1) 115 25 ft tubular steel columns/brackets; (2) 115 140 W sodium Group "A" lanterns; (3) 115 140 W sodium lamps. Erection of columns.—Advertised 28 Sept. issue.

6 Nov.—Newtownabbey U.D.C. 250 Group "B" fluorescent lanterns/lamps/control gear/concrete columns.—See 5 Oct. issue.

8 Nov.—Yorkshire E.B. Supply of distribution transformers. Secretary: E. K. Richmond, Wetherby Rd, Scarcroft, Leeds.

20 Nov.—E.B. for N. Ireland. Specification N.I.1719. Supply and commissioning of 110 kV, 33 kV and lower voltage cables/accessories for Rosebank substation—Belfast East Power Station interconnection. Details from consulting engineers: Kennedy and Donkin, 12 Caxton St, S.W.1. Deposit £5 5s. Applications by 16 Oct.

No date stated—Betwys-y-Coed U.D.C. 63 trunk road lighting columns with sodium lighting.—See 14 Sept. issue.

. . . and Overseas

*Details of items marked * may be obtained on application to the Board of Trade, Lacon Hse, Theobalds Rd, W.C.1, quoting reference.*

18 Oct.—Burma. Fluorescent lamps/fittings/lamps/bell-push buttons and 23/·0076 and 70/·0076 3-core t.r.s. flexible cable. Director-General, Union of Burma Purchase Board, St. John's Rd, Rangoon. B.o.T. (ESB/30727 and 8/61).*

20 Oct.—India. Three five-panel 11 kV switchboards with 150 MVA o.c.b's. Gujarat Electricity Board, Kothi Bldgs, Raopura, Baroda. B.o.T. (ESB/30385/61).*

21 Oct.—Pakistan. 60 to 400 A iron-clad t.p. rewirable switch fuse units for WAPDA. R. E. B. Willcox and Co., 36 Gt. St. Helens, E.C.3, are representatives.

23 Oct.—Australia. 18 220 kV 600 VA potential transformers. Secretary, S.E.C. of Victoria, 22-23 William St, Melbourne. B.o.T. (ESB/30470/61).*

26 Oct.—Greece. Insulating materials (eight items). Ministry of Trade, Derection "B" State Purchases, 50 Socratous St, Athens. B.o.T. (ESB/30712/61).*

28 Oct.—Iraq. Electrical sets for Qara-Tappa, Shaikh Sa'ad and Muwafaqia. Directorate-General of Planning and Design, Ministry of Municipalities. B.o.T. (ESB/30456/61).*

28 Oct.—Pakistan. 11 kV o.c.b's for WAPDA. R. E. B. Willcox and Co., 36 Gt. St. Helens, E.C.3, are representatives.

30 Oct.—Pakistan. Five single-panel l.t. switchboards with 1,000 A o.c.b's and another five with busbars and 1,200 A o.c.b's for WAPDA. R. E. B. Willcox and Co., 36 Gt. St. Helens, E.C.3, are representatives.

31 Oct.—India. Requirements of Chief Engineer (South), Stores Purchase Section, Punjab S.E.B., The Mall, Patiala. 50 and 100 kV 11/·415 kV distribution transformers, B.o.T. (ESB/30443/61).* Closing date: 20 Nov.—Kit Kat fuses, B.o.T. (ESB/30449/61).* Closing date: 28 Nov.—14 and 16 s.w.g. copper-binding wire. B.o.T. (ESB/30449/61).*

2 Nov.—India. 500 kVAr and 50 kVAr capacitor units, relays and meters. Controller of Stores, Bombay Electric Supply and Transport Undertaking, Best Hse, Bombay 1. B.o.T. (ESB/29141 and 2/61).*

8 Nov.—S. Africa. Five electrical distribution boards, l.t. 380 V. Secretary, State Tender Board, 291 Bosman St, P.O. Box 371, Pretoria (ESB/30427/61).*

14 Nov.—Ceylon. Supply of ten tons No. 1 s.w.g. hard drawn bare copper wire; five tons No. 4 s.w.g. hard drawn bare copper wire; five tons copper tape, 1 in. wide by ¼ in. thick. Crown Agents, 4 Millbank, S.W.1 (ESB/29964/61).*

14 Nov.—Ceylon. 70 33 kV gang-operated air-break switches; 30 11 kV gang-operated air-break switches. Crown Agents, 4 Millbank, S.W.1 (ESB/29963/61).*

14 Nov.—India. Punjab State Electricity Board. Supply of 250 11 kV 75 MVA automatic re-closing o.c.b's. Chief Engineer (South), Stores Purchase Section, The Mall, Patiala (ESB/30444/61).*

21 Nov.—Egypt. 140 km 33 kV transmission line. Sibaiya-Qenc. Assistant Under Secretary of State for Mechanical and Electrical Dept., Ministry of Public Wks, Cairo. B.o.T. (ESB/29731/61).*

21 Nov.—Uruguay. 150 kVA s.c. overhead line, a.c.s.r. conductors with 242 sq mm aluminium cross-section of equivalent hollow copper conductor, 7 km long, for State Electricity Board (ESB/30330/61).*

24 Nov.—New Zealand. 7,150 yd three-core 22 kV internal gas pressure cable, straight through joints and accessories; 250 yd 0·75 sq in. single-core 22 kV solid type cable and terminations; 3,500 yd pilot cable straight through joints and terminations. Chairman, Auckland Electric Power Board, Power Board Bldgs, Queen St, Auckland, Tender No. S7/61 (ESB/30428/61).*

1 Dec.—India. Supply and erection of transformers, switchgear and protective equipment for substations at Jhansi, Kanpur, Orai, Mauranipur and /Mahoda, for U.P. State Electricity Board. Tender form (Rs.50 fee) from Superintending Engineer, Engineering and Construction Circle, U.P. State Electricity Board, Canal Office Bldg, Cantonment Rd, Lucknow.

7 Dec.—Turkey. 125 and 400 kVA transformers. Devlet Su Isleri Umum Müdürlügü, Barajlar ve Hidroelektrik Santraller, Dairesi Reisligi, Bestekar Sokak 25, Ankara. B.o.T. (ESB/28802/61).*

18 Dec.—India. Four 80 MVA generators for Koyna H.E. project. Details from Chief Engineer (Electrical), Mercantile Bank Bldg, Bombay 1. Documents fee Rs 75, plus Rs 6 postage by M.O.

27 Dec.—India. Power line carrier equipment for Kanpur-Allahabad-Mirzapur lines. Director of Designs, Rihaud H.E. Design Directorate, 10/499 Allenganj, Kanpur. B.o.T. (ESB/29426/61).*

23 Jan.—New Zealand. Four 65 MVA hydrogen cooled outdoor synchronous condensers with direct-coupled 450 kVA auxiliary generators. Secretary, Tenders Committee, N.Z. Electricity Dept., Wellington. B.o.T. (ESB/30471/61).*

6 Feb.—New Zealand. Four single-phase double-wound transformer units, each 10 MVA, outdoor type, oil-immersed, to form outdoor 30 MVA three-phase bank with one spare bank. Secretary, Tender Committee, New Zealand Electricity Dept., Wellington (ESB/29916/61).*

2 March—New Zealand. Centralised supervisory and control system for use with 33 kV and 6·6 kV systems with control desk and mimic diagram display panel to have provision for telemetering, telephone communition and alarm annunciation. Town Clerk, P.O. Box 5045, Dunedin. B.o.T. (ESB/28586/61).*

CONTRACTS PLACED

Durham C.C. Electrical work in: Swalwell Village Hall, £820, and Winlaton Village Hall, £830, G. and A. Walton; Castle Eden Controlled School, £315, Hare Law Day School, £2,427, Felling Leam La Community and Youth Centre, £1,295, Gray Bros; Cleadon County Junior School, £2,211 and Ryhope Robert Richardson Grammar School, £9,105 10s, Cook and Dawson Ltd.; Silkworth County School, J. Ward (Electrical) Ltd., £429 18s; Newton Ayecliffe Maternity and Child Welfare Centre and Library, Cox-Walkers Ltd., £2,007; West Petton Modern School, C. Horne and Co. Ltd., £6,756. Recommended.

Dudley T.C. Street lighting contract 4, Revo Ltd., £27,242; service connections, £13,982, and conversion of existing lighting, £776, Midlands Electricity Board. Additional installations in 303 pre-war houses, Midlands E.B., £2,948. Recommended.

East Devon. Supply of duplicate pumps/auxiliary equipment for Colyford Booster Station, Sulzer Bros (London) Ltd., £1,228.

London C.C. Supply and installation of 453 dwellings in Downham estate, Lewisham, F. J. Baynes and Co. Ltd., £24,595.

Luton B.C. Re-wiring 20 houses, Cannon La, £681, and 29 houses, Dordans Rd/Roman Rd, £990, J. and J. Burtenshaw and Ptnrs. Electrical installations in: Whipperley Ring flats, E.T. Electrical, £8,456; Corpn. Hanger at Airport, B. Thomas, £4,275. Recommended.

Manchester C.C. Electrical installation in No. 1 Beech Mount conversion scheme, Sadler and Kinsey Ltd.; passenger lift at Didsbury Training College Hostel, A. and P. Steven Ltd.

Newbury B.C. Street lighting conversion scheme, Cohen Bros (Electrical) Ltd., £33,854. Recommended.

Salford C.C. Electrical installation in "Ingleside," Oakwood Pk, J. Barnes (Electrical) Ltd., £2,334. Recommended.

Sheffield C.C. Electrical services in High Storrs Grammar Schools extensions, Tinsley Electric Co. Ltd., £15,739; Stage lighting of Oval Hall in City Hall, Grierson Ltd., £1,420. Recommended.

Willesden B.C. Electrical installation, Phoenix Electrical Co. (London) Ltd., £3,714, and lift installation, Bennie Lifts Co. Ltd., £12,017, in Dyne Rd office block; lift installation in Kilburn Sq redevelopment, Bennie Lifts Ltd., £10,954; electrical services in Kingsley Wks rehabilitation, Marryat and Place Ltd., £897. Recommended.

Wallasey T.C. Electrical installation in new Technical High School, F. H. Ashworth, £7,064. Recommended.

TRADE NOTES

Changes of address. The Birmingham Midland area sales office of Simmonds Aerocessories Ltd. has moved to Herbert Hse, Cornwall St.

George Pike Ltd. have moved to York St, Stockton-on-Tees. The telephone number remains 67599.

Arrow Electric Switches Ltd. point out that correspondence for them is still being sent to Hanger Lane, Ealing, instead of Brent Rd, Southall, to where they moved a few months ago.

The offices of R. W. Gregory and Ptnrs. have been moved to 42 Kingsway, W.C.2. Telephone: Holborn 9671.

Ampex Gt. Britain Ltd. are now at 72 Berkeley Ave, Reading. Telephone: Reading 55341.

Change of name. The title of Racal Engineering Ltd. has been changed to Racal Electronics Ltd.

Import duty. The Board of Trade are considering an application for the exemption from import duty of (a) electrolytic manganese metal of not less than 99·5% purity and (b) managanese nitride containing not less than 4% by weight of nitrogen in all. Parties interested wishing to make representation should notify the Tariff and Import Policy Division of B.o.T. by 18 Oct.

Representatives. The Key Engineering Co. have appointed G. T. Richardson as a representative operating from the London office.

Prior to going to Australia where he will become special representative for Doulton Industrial Porcelains Ltd., Mr D. W. Lennon was introduced to other electrical interests at a cocktail party in London last week. Mr Lennon will be based on Doulton's agents at Enfield Cables (Pty.) Ltd., 279 Clarence St, Sydney, N.S.W.

BUSINESS PROSPECTS

Abram. J. W. Liptrot, Brook La, Pemberton, proposes residential development of nine acres, Lee La.

Amesbury. Clifton R.C. Diocesan Trustees propose new primary school.

Andover. Proposed: 48 houses, Vigo estate, for H. C. Janes Ltd., High Town Rd, Luton.

Aylesbury. Bucks C.C. plan Weedon Rd junior school to cost £234,920.

Ayr. Weir Housing Corp. Ltd., Coatbridge, Lanarks, propose 153 dwellings, costing £591,600, Clochramhill, Rozelle estate.

Bedford. N.W. Metropolitan Regional Hospital Board, 40 Eastbourne Terr, W.2, inviting applications by 30 Oct. for inclusion in list from which tenders will be invited for two-storey out-patient/casualty/pathological depts., Bedford General Hospital, Kempston Rd; cost: £214,000; Regional Architect.

Belfast. N.I. Housing Trust, 12 Hope St, propose residential development on 75 acres, Dunmurray La.

Bishop Auckland. G. McCall Ltd., New Herrington, propose 24 houses, Church St, Coundon.

Blandford. E. U. Chesterton, Moneys Yd, N.W.3, architect for 23 houses, Wimborne Rd, proposed by E. M. Cowley.

Bolton. Proposed: 38 houses, Crescent Rd, for J. Turner and Sons Ltd., Accrington.

Bournemouth. Park Investments Ltd., 98 Park La, W.1, placed contracts as follows: flats, Surrey Rd, J. Drewitt and Sons Ltd., Ringwood Rd, West Howe, £148,000; flats, Chien Crescent Rd, G. T. Crouch Ltd., 7 Castleton Rd, Eastcote, Ruislip, £80,000.

Bray. Ten-storey flats proposed, Bray Court, for Bray Court Properties Ltd., King's Ride Gdns, Ascot.

Bristol. Proposed: 72 flats, Ivor Hse, Durdham Park, Factory, Waterloo St, Old Market, proposed by A. T. Poeton and Son Ltd., Tower Plating Wks, Tower Hill; architect for both projects: R. Moxley, Chesterfield Chmbrs, Westbourne Pl, Clifton, Bristol 8.

Bromley B.C. Tender: 100 dwellings, Burnt Ash La; Engineer.

Burnham. Manor Park Construction Ltd., Frances Rd, Windsor, propose 80 dwellings, Gore Rd.

Camberley. 700 dwellings proposed, Burrow Hill Farm, Frimley, by H. Boot and Sons (Southern) Ltd., The Boltons, S.W.10.

Carlton U.D.C. Tender: 98 houses, Phoenix Farm estate; Surveyor.

Chester. The Circuits Management Assoc. Ltd., 11 Belgrave Rd, S.W.1, plan to convert Gaumont Cinema into bowling centre.

Chesterfield. 176 houses, Mansfield Rd, Winswick, proposed by F. Clifton Ltd., Rockingham St, Sheffield.

Chichester C.C. Tender: replacement of sewage pumping machinery and control gear, Mill La pumping station; Surveyor.

Chippenham. Seven-acre residential development, Frogwell Poultry Farm, proposed by A. J. Waite Ltd., Littlers Close, S.W.19.

Chislehurst and Sidcup U.D.C. Tender: 54 dwellings, Gattons estate, North Cray; Surveyor, Sidcup.

Coventry. Housing development of 120 acres, south side, proposed by F. G. Minter Ltd., building contractors, Buckingham Gate, S.W.1.

Crowthorne. 112 dwellings, Oaklands La area, proposed by executors of H. E. Burbridge and J. R. Knox, Crowthorne.

Croydon. Taylor Woodrow Homes Ltd., Taywood Rd, Greenford, propose development to include 81 houses, rear of Queen's Hotel, Church Rd, Upper Norwood.

Darlington. Shopping block, Northgate, proposed by Ravenseft Properties Ltd.; architects: Fewster and Ptnrs., 22 Conduit St, W.1.

Derby. Wm. Moss and Sons Ltd., Loughborough, contractors for proposed B.R. £1½ million laboratories, London Rd.

Devizes. S. R. Dodge propose 50 dwellings, Blounts Court, Potterne.

Doncaster. T.C. award £859,164 contract for three 14-storey blocks of flats and two nine-storey blocks to Geo. Wimpey and Co. Ltd.

Downpatrick. R.D.C. propose 250 dwellings, Killyleagh and Ballynahinch, Co. Down.

Durham. Marshall Sisson, Godmanchester, Hunts, architect for proposed University arts building, New Elvet. Geology Bldgs proposed by University at South Rd. Architects, Robertson, Cusdin, Preston and Smith, 53 Bedford Sq, W.C.1.

Eston. Parkway Estates Ltd. propose 1,000 dwellings to cost £4 million, 75-acre site, Normanby.

Friern Barnet. E.E.B. propose development of land, Oakleigh Rd and Carlisle Pl, for meter testing and repair shops.

Greenwich. Listroy Investments Ltd. propose 292 flats, Heath La, Blackheath.

Ham. 30-acre residential development proposed on riverside land by Wates Ltd., 1258 London Rd, S.E.16.

Hamilton B.C. Tender: 94 dwellings, Uddston-Hillhouse. Architect.

Haverhill U.D.C. Tender: four small factories; architect: J. C. Myers, 23a High St.

Hendon. Proposed: block of 54 luxury flats, Hendon Hall Hotel, Gt. North Way; cost: £280,000; contractors: Tersons Ltd., 4 Dollis Park, Finchley, N.3.

Hurst Park. 54-acre development, Hurst Park racecourse, proposed by Hurst Park Club Syndicate and Wates Ltd., contractors, 1258 London Rd, S.W.16.

Leicester. C.C. propose adult training centre and workshops, to cost £125,000.

Liverpool. Evans and Williams Ltd., Aspen Grove, propose six shops, Wambe La.

London. Austin Vernon, Buckingham Pl, S.W.1, architect for 74 houses, proposed, Croxted Rd, Dulwich. Span Developments Ltd., The Hall, Fixes Dale, S.E.3, propose flats to cost £148,000, South Rd, S.E.3; contractors: Thomas and Edge Ltd., Macbean St, S.E.18. Shops/flats to cost £125,000 planned. Moscow Rd, W.2; contractors: E. J. Robinson Ltd., Praed St, W.2. 88 flats in 11-storey block, Totteridge La area, N, proposed by Fitzpatrick and Nicholson Ltd., Old Ford Rd, E.3. Offices/warehouse to cost £162,000, Sun St area, proposed; contractors: C. P. Roberts Ltd., High Holborn, W.C.1. £125,000 contract placed with Holland & Hannen and Cubitts (G.B.) Ltd., 1 Queen Anne's Gate, S.W.1, for Nuffield hearing and speech centre adjoining the National E.N.T. Hospital, Gray's Inn Rd, W.C.1. Keystone Freehold Properties Ltd. plan shops, restaurant, maisonnettes and flats, Heath St, Hampstead, N.W.3. Proposed: office building with shops, Wandsworth High St, for T. Pike, Mount St, W.1; architect: William Ryder, 21 Bruton St, W.1; cost: £103,000. Demolition on store of F. Gorringe Ltd., Buckingham Palace Rd, S.W.1; tenders invited for £1 million reconstruction of store; architect: Morris de Metz, 29 Gloucester Pl, W.1.

Lowestoft. Proposed: six-storey "boatel," Oulton Broad area. Architect, R. Corless.

Manchester. Two 11-storey blocks of flats, Pink Bank La, Longsight, proposed by F. Entwhistle (Builders) Ltd., Cheadle Hulme. A. Robinson and Sons, West End Rd, propose 90 bungalows in same area.

Middlesbrough. A. E. Gray and Son Ltd., Tynedale St, Stockton, propose 26-acre residential development, Tollesby.

Morecambe. 122 bungalows, Westgate, proposed by Kelly Bros. Ltd.

Newcastle. Steinlet and Son, 4 Queen Sq, architects for proposed plastic surgery unit, Royal Victoria Infirmary. W. B. Edwards and Ptnrs, Cathedral Bldgs, Dean St, architects for proposed £720,000 new college, Scotswood Rd area.

Northampton. Bernard Sunley Investment Trust Ltd. propose 55 dwellings, Collingtree Grange estate.

Northumberland. Wm. Leech (Builders) Ltd., St. James St, Newcastle, propose £50 million township, Cramlington, with minimum population of 40,000 to be built over next 20 years. C.C. have accepted the following school building tenders: J. C. Green and Son, Warworth, proposed South Bromhill Secondary School, £147,000; Gilbert Ash Ltd., London, Newbiggin Secondary School, £241,000.

North Riding. C.C. propose Lakes estate Primary School, Redcar. Architects, Johns, Slater and Haward, 32 Foundation St, Ipswich.

NEW COMPANIES

Extracted from the Register issued by Jordan and Sons Ltd., 116 Chancery La, W.C.2.

Archard Electrical Co. Ltd., Beaumont, Homestead Rd, Ramsden Bellhouse, Billericay. Nom. cap.: £500. Dirs.: Sydney G. Archard, James Dowson and Norman G. Archard.

Audio Distributors Ltd., Market Chmbrs, Market Pl, Blackheath, Birmingham. Electrical engineers, etc. Nom. cap.: £100. Dirs.: Ronald E. Bell and John C. Cooper.

Becker-Eriez Ltd., 34-40 Ludgate Hill, E.C.4. Designers and manufacturers of and dealers in magnetic equipment, electronic and electro-magnetic mechanisms and devices, etc. Nom. cap.: £1,000. Dirs.: Percival F. D. Cornish and Evelyn J. Lethbridge.

Bobrich (Manufacturing) Ltd., 66 Queen St, E.C.4. Domestic, industrial and labour saving and all other kinds of electrical appliance and device engineers, etc. Nom. cap.: £10,000. Dirs.: to be appointed by subs. Subs.: Donald A. Marchant and Brian J. E. Hager.

Encapsil Ltd., 11 Hounslow Gdns, Hounslow, Middx. Electronic, electrical, mechanical, precision and general engineers, etc. Nom. cap.: £100. Dirs.: Arnold J. Templeman, Miss Sheila M. Templeman, Peter Templeman, Dennis J. Grover and Albert A. Norman.

G.E.C. (Lighting and Equipment) Hldgs Ltd. Nom. cap.: £100. Dirs.: to be appointed by subs. Subs.: J. M. Vickers and H. G. Bond, Magnet Hse, Kingsway, W.C.2.

A. C. Grubb Ltd., Sun Bldg, Bennetts Hill, Birmingham 2. Electrical engineers, etc. Nom. cap.: £100. Dirs.: Alfred C. Grubb and Annie B. Grubb.

Langney Electronics Ltd., 25 Church St, Eastbourne. Nom. cap.: £100. Dirs.: Roy E. E. White and Jean R. White.

E. Marchant (Electrical Engineers) Ltd. Nom. cap.: £100. Dirs.: Leslie W. Harris and Florence L. Harris, 29 Harrow La, Maidenhead.

Moflash Co. Ltd., 72-73 Warstone La, Birmingham 18. To take over the business of electrical equipment manufacturers carried on at Birmingham, etc. Nom. cap.: £100. Dirs.: to be appointed by subs. Subs.: Edwin B. Gibson and Silvaflame Co. Ltd.

Palmerston Electricity Services Ltd. Nom. cap.: £100. Dirs.: Arthur T. Cook and Mrs Winifred A. Cook, 101 Southbourne Overcliff Dr, Southbourne, Bournemouth.

She-Mil Ltd., 175-179 St. John St, Clerkenwell, E.C.1. Agents for the importation, exportation, purchase and sale of electronic and scientific instruments, etc. Nom. cap.: £1,000. Dirs.: Stanley H. Elliott and Joan Elliott.

Tutor-Tape Co. Ltd., Aviation Hse, 66 Sloane St, S.W.1. Electronic equipment, etc. Nom. cap.: £200. Dirs.: Erich Eiser and Mrs Dorothea Eiser.

Business Prospects—continued

Norwich. 88 dwellings, five shops, Sprowston Rd, proposed by Embridge Developments Ltd.

Peterborough. C. W. Shelton Ltd., South St, Stanground, proposes residential development of 240 acres, Gunthorpe. C. W. Shelton Ltd., South St, Stanground, propose 71 dwellings, Thorpe Gdns.

Romsey. B.C. proposes 90 dwellings, The Hundred; Engineer.

Rotherham. Tarmac Civil Eng. Co. Ltd., Upper Wortley Rd, awarded contract for large works, Sheffield Rd, for G. L. Willan Ltd. Contract placed with H. Fairweather and Co. Ltd., St. James's La, N.10, for £275,000 multiple store in High St for Hammerson Group.

Rothwell. Proposed: 27 dwellings, Desborough Rd, for Adkins and Shaw Ltd., St. James St, Northampton.

Rugby B.C. Tender: 89 dwellings, Abbotts Farm estate; Surveyor.

Rustington. 32 flats, costing £150,000, proposed Seafield Court; architects: Skinner and Bailey, 74 Queensway, W.2.

Salford. C.C. propose reconstruction of Broughton High School for Girls. Architect.

Salisbury. Wilts C.C. propose 172 dwellings in 1962-3 housing programme; County Architect, Salisbury.

Sheffield. Bylander, Waddell and Ptnrs., Wembley Park Dr, Wembley, consulting engineers for proposed £33 million expansion of Park Gate Iron and Steel Co. Ltd., at Aldwarke. B.C. appoint Ian Hunter and Ptnrs. as electrical consultants for West Bar Green Divn. Police H.Q.

Shepshed U.D.C. Proposed: 18 dwellings, Queen St; Surveyor.

South Shields. B.C. proposes 217 houses, Whiteleas, 62 houses, Brunswick, and 120 dwellings, Simonside, in 1962. Engineer.

Stockton. 159 dwellings, nr. Lonesom Hall Farm, proposed by Moorhouse and Barker Ltd., Thornaby Rd, Thornaby. R. W. Bell and Co. Ltd. (Bldrs), Mistletoe Rd, Jesmond, propose 40 dwellings, Darlington La.

Stoke-on-Trent. J. Seymour Harris and Ptnrs., 3 and 4 Greenfield Cres, Edgbaston, architects for shops/offices/supermarket, Old Hall, Charles St, etc.

Sunderland. B.C. proposes 411 dwellings, Town End Fm estate. Architect.

Swindon. Richard Costain (Construction) Ltd., Westminster Bridge Rd, S.E.1, contractors for proposed Square "D" Ltd. £400,000 factory, Rodburne industrial estate.

Torquay. Proposed: 100 dwellings, Cadwell estate, for H. B. Kingston Ltd., London Rd, Kingston.

Twickenham. Proposed: ten-storey office block incorporating licensed premises for Yorkshire Insurance Co.; contractors: Tersons Ltd., 4 Dollis Park, N.3.

Walsall. Brownhills Sheet Metal Ltd., Camden Wks, Walsall Wood, propose new factory, Coppice Rd. W. H. Whitehouse and Son (Builders) Ltd., contractors for proposed factory, Fryers Rd, Bloxwich, for Lander and Ptnrs. Ltd., Littleton St East, Walsall.

Wembley. Contract placed for 15-storey building to cost £500,000 on site next to Wembley Stadium, for Centrovincial Estates, in association with Yorkshire Insurance Co.; contractors: Bernard Sunley and Sons Ltd., 25 Berkeley Sq, W.1. Bowling centre to cost £250,000 planned for site next to Wembley Stadium; architects: Stock, Page and Stock, 3 Fanshaw St, E.C.1.

Westbury. Assoc. Portland Cement Mnfs. Ltd., Portland Hse, Tothill St, S.W.1, propose £3 million works.

West Sussex. Prowting Estates Ltd., High St, Ruislip, Middx, propose residential development of 20 acres, Selsey, and eight acres, Hunston.

Whickham. J. H. James and Son, Archer St, Wallsend, propose 46 houses, Dunston Rd, Dunston.

Wortley. Tender: 54 traditional dwellings, Piece End, High Green; Engineer, Grenoside, Sheffield.

New lighting schemes

Chesterfield B.C. Improved street lighting has been proposed for the area north of Church Way to the Brierley Bridge boundary.

Colwyn Bay B.C. Stage II of gas conversion scheme due to be completed in 1963 includes most of the main roads in Rhos-on-Sea.

Gateshead C.B.C. Further gas conversion schemes have been approved involving 238 units at an estimated cost of £13,270.

Manchester C.C. Tungsten lighting in High St, City, and in Princess St between Albert Sq and Mosley St to be replaced by colour-corrected mercury lighting. Gas conversion scheme for Chorlton-cum-Hardy, Gorton, Cheetham, Newton Heath and Blackley has been approved by Highways Committee.

Middlesbrough C.B.C. £50,000 gas conversion scheme in outer areas of the town scheduled for 1962-3. Lighting of College Rd and The Greenway to cost £1,050.

GAZETTE ANNOUNCEMENTS

COMPANIES ACTS

G. and T. Electrics Ltd. Petition for winding-up to be heard before the High Court of Justice, Strand, W.C.2, on 16 Oct. Persons intending to appear to notify Cochrane and Cripwell, 119 Finsbury Pavement, E.C.2, by 4 p.m., 13 Oct.

Bandeco Ltd. First meetings of creditors and contributories to be held at 37 Temple St, Birmingham 2, on 18 Oct., at 11 a.m. and 11.30 a.m., respectively.

Hildethorpe Electrical Supplies Ltd. Creditors to send particulars of debts and claims to liquidator: Mr R. W. Hellyer, Brotherton Chmbrs, Westgate, Leeds 1, by 20 Oct.

Chiltern Electrics Ltd. Meeting of creditors to be held at Crown Hotel, Church Rd, Stanmore Middx, on 13 Oct., at 3 p.m.

Singleton Bros. (Instruments) Ltd. Mr E. T. Wood, 7-8 Chandos St, W.1, appointed liquidator at extraordinary general meeting on 18 Sept. for the purpose of voluntarily winding-up.

Trinity Trading Co. Ltd. Mr J. Auerbach, 9 Mansfield St, W.1, appointed liquidator at extraordinary general meeting on 14 Sept. for the purpose of voluntarily winding-up.

Hobday Bros. Ltd. Meetings of members and creditors to be held at Winchester Hse, Old Broad St, E.C.2, on 23 Oct., at 12 noon and 2.15 p.m., respectively, to receive an account of winding-up proceedings for the year to 25 July, 1961.

BANKRUPTCY ACTS

Receiving Orders

Stockton-on-Tees. A. Rose, electrical contractor, 18 Rosebury Rd, Norton, Stockton-on-Tees. Order dated 19 Sept.

Bury St. Edmunds. J. W. Carrington and R. A. Fenn, electrical contractors and retailers, carrying on business in partnership at 25a Angel Hill. Receiving order dated 25 Sept.

Kingston upon Thames. R. Martin and Co., radio, television and electrical dealers, formerly carrying on business at 62 The Green, Twickenham. Receiving order dated 22 Sept.

Leeds. D. V. M. Jones, electrical factors, formerly carrying on business as J. and M. (Northern) Electrical Appliances at 100-102 Town St, Stanningley. Receiving order dated 25 Sept.

Edmonton. Phoenix Enfield Supplies, appliance retailers, of 11 Napier Rd, Ponders End. Receiving order dated 28 Sept.

Newcastle upon Tyne. J. A. Parker, appliance dealer, lately carrying on business at 240 Chillingham Rd, Heaton, and formerly at 42 Huddlestone St, Cullercoats, as Household Refrigeration and previously as Cardiff Vacuum Cleaner Co. at 23 St. Mary's St, Cardiff. Receiving order dated 26 Sept.

Public Examinations

Preston. E. Middleton, electrical dealer, formerly carrying on business at 83 Friargate, Preston. Public examination: 10.30 a.m., 17 Nov., at Sessions Hall, Lancaster Rd, Preston.

Sheffield. B. L. V. Page, domestic electrical appliance retailer, carrying on business as Page Domestic Electrical Appliances at 77 Cleveland St, Doncaster, and formerly at 33-34 Scot La, Doncaster, 7 North Way, Scarborough, and 17 St. Sepulchre Gate, Doncaster, and previously at 7 London Rd, Grantham. Public examination: 2 p.m., 14 Dec., at County Court Hall, Bank St, Sheffield 1.

Cheltenham. D. A. Durston, electrical engineer, formerly carrying on business as E.M.U. Contracts at "Llo-cha," and Dever, New Inn La, Shurdington. Public examination: 11 a.m., 28 Nov., at Court Hse, County Court Rd, Cheltenham.

Durham. Viking Electrics, electrical dealers, formerly carrying on business at "A" Warehouse, Shildon Railway Station, and lately at 37 Church St, Shildon. Public examination: 10.30 a.m., 11 Dec., at Assize Court, Old Elvet, Durham.

Appointment of Trustee

Northampton. L. Eddershaw, electrical contractor, carrying on business as S. and E. Electrical at 23 Greyfriars St. Mr J. B. Corrin, Castilian Chmbrs, Castilian St, Northampton, appointed trustee as from 22 Sept.

Intended Dividends

Bolton. N. Pilling, electrical contractor, formerly carrying on business at 48 Bury Rd. Last day for receiving proofs for intended dividend: 17 Oct., by trustee: J. Tye, 20 Byrom St, Manchester 3.

Macclesfield. A. Wilks, retailer and manufacturer, formerly carrying on business as A. Wilks and Co. and P.L. Electronics at 52 Cheetham Hill Rd, Macclesfield. Last day for receiving proofs for intended dividend: 17 Oct., by trustee: W. H. Meredith, 12 Lonsdale St, Stoke-on-Trent.

TRADE MARKS

This information is extracted from the Official Journal by permission of the Controller.

Caravelle. 807,414. Class 9. Vacuum cleaners incorporating brushes and shoe brushes operated by batteries, etc. S. D. Rand Ltd., 29 Beak St, Regent St, W.1.

Denloy. B818,531. Class 11. Lighting installations, etc. Cordwallis Non-ferrous Metals Ltd., Denmark St, Maidenhead, Berks.

Dirigent. 814,011. Class 11. Electrotechnical illuminating, heating, cooking, cooling, drying apparatus, etc. Standard Telephon und Telegraphen Aktiengesellschaft Czeija, Nissl and Co., Dresdnerstrasse 73/77, Vienna 20, Austria.

Eltrofin. 820,136. Class 11. Heating elements fitted with fins or gills. Eltron (London) Ltd., 2 Strathmore Rd, Croydon.

Pye in design. 817,037. Class 10. Pads, blankets, etc. Pye Ltd., Radio Wks, St. Andrew's Rd, Cambridge.

Raysig. 822,246. Class 11. Heating apparatus embodying glass-embedded elements, plate warmers, hotplates, etc. Railway Signal Co. Ltd., 96 York Way, King's Cross, N.1.

Smiths. 804,928. Class 9. Timing and switching mechanisms, etc. S. Smith and Sons (England) Ltd., Cricklewood Wks, Edgware Rd, N.W.2.

Three Star in design. 818,388. Class 9. Temperature indicators, thermostats, instruments, etc. Tyer and Co. Ltd., Perram Wks, Merrow, Guildford.

MEETINGS TO NOTE

THURSDAY, 12 OCT.

I.E.E. (E. Midlands). "The I.E.E. Wiring Regulations," Forbes Jackson. E.M.E.B. Showrooms, Spalding. 7.30 p.m.

I.E.E. (N. Scotland). Centre Chairman's address, E. G. Cullwick. Electrical Engineering Dept., Queen's College, Dundee. 6 p.m.

I.E.E. (W. Wales). Chairman's address, W. E. Lewis. Electricity Board Showrooms, The Kingsway, Swansea. 6 p.m.

I.E.E. (Utilisation). Chairman's address: "Research in the Field of Electricity Utilisation," H. G. Taylor. Savoy Pl, W.C.2. 5.30 p.m.

RADAR AND ELECTRONICS ASSOCIATION. "Space Communications—Systems and Equipment," L. F. Mathews. Royal Society of Arts, John Adam St, W.C.2. 7 p.m.

MINISTRY OF WORKS. "Colour and Light in Buildings," A. E. Hurst. Municipal Technical College, Blackburn. 7.15 p.m.

INSTITUTION OF PLANT ENGINEERS (N. East). "Management Problems in a Maintenance Department," T. Gormley. Roadway Hse, Oxford St, Newcastle upon Tyne 1. 7 p.m.

SOCIETY OF INSTRUMENT TECHNOLOGY (E. Midlands). "The Commonsense Approach to Instrument Manufacture," C. E. T. Cridland. The Derby and District College of Technology, Kedleston Rd, Derby. 7.30 p.m.

SOCIETY OF INSTRUMENT TECHNOLOGY (Tees-Side). "Automation in the Post Office," N. Burley. Cleveland Scientific and Technical Institution, Middlesbrough. 7.30 p.m.

I.E.S. (Cardiff). Chairman's address, G. J. Everett. Grand Hotel, Cardiff.

I.E.S. (Manchester Centre). "The New I.E.S. Code," J. G. Holmes. Demonstration Theatre, NWEB, Town Hall Extension, Manchester 2. 6 p.m.

I.E.S. (Nottingham Centre). Chairman's address, Electricity Centre, Carrington St, Nottingham. 6 p.m.

A.S.E.E. (Bradford and District Branch). "A New Approach to Traction Battery Charging," D. Kirkby. The Midland Hotel, Bradford. 7.30 p.m.

A.S.E.E. (Nottingham Branch). "Control Centres for Modern Industry," R. Ritchie. People's College of Further Education, Castle Rd, Nottingham. 7.30 p.m.

BRITISH INSTITUTION OF RADIO ENGINEERS. Discussion: "The Position of the Engineer in Management." Lanchester Bldg, Southampton University. 7 p.m.

I.E.E. (N.E. Graduates and Students). Chairman's address: "The Impulse Strength of Transformer Windings," A. C. Hall. Sunderland Technical College. 6.30 p.m.

FRIDAY, 13 OCT.

I.E.E. (N. Scotland). Centre Chairman's address, E. G. Cullwick. Robert Gordon's Technical College, Aberdeen. 6 p.m.

JUNIOR INSTITUTION OF ENGINEERS. "The Technician, Education and Industry," J. Heywood. Pepys Hse, Rochester Row, S.W.1. 7 p.m.

SOCIETY OF INSTRUMENT TECHNOLOGY (Midlands). "Differential Producers for Flow Measurement," H. E. Dall. Lecture Theatre, Byng Kendrick Suite, Gosta Green College of Technology, Aston St, Birmingham. 7 p.m.

A.S.E.E. (Reading and Districts Branch). Annual Dinner and Dance. Calcot Hotel, Reading.

A.S.E.E. (Stoke and Crewe Branch). Annual Dinner. Grand Hotel, Hanley.

E.P.E.A. (Meter Engineers' Technical Group). "The Meaning of Engineering," W. T. O'Dea. Caxton Hall, S.W.1. 6.30 p.m.

SATURDAY, 14 OCT.

A.S.E.E. (Liverpool and District Branch). Annual Dinner and Dance. Mecca Restaurant, Exchange St East, Liverpool.

MONDAY, 16 OCT.

I.E.E. (Mersey and N. Wales). "The 12 MeV Van de Graaff Accelerator to be Installed at Liverpool University," B. S. Halliday. Chadwick Laboratory, Liverpool University. 6.30 p.m.

I.E.E. (N.E. Measurement and Electronics Group). Chairman's address, A. J. Colgan. Rutherford College of Technology, Northumberland Rd, Newcastle upon Tyne. 6.15 p.m.

I.E.E. (Western Supply Group). Chairman's address, F. G. Copland. S. Wales Institute of Engineers, Park Pl, Cardiff. 6 p.m.

I.E.E. (London Graduates and Students). Chairman's address, C. F. Price. Savoy Pl, W.C.2. 6.45 p.m.

BIRMINGHAM ELECTRIC CLUB. "Underwater Nuclear-powered Freighters," E. A. Woodward and P. B. Mason. Grand Hotel. 5.30 p.m.

A.S.E.E. (Bournemouth and District). "Earth-fault-loop Impedance Testers," R. B. Kerley. Grand Hotel, Firvale Rd. 8 p.m.

A.S.E.E. (Bristol and West). "Rectifiers," J. C. McGill. Royal York Hotel, Bath. 8 p.m.

A.S.E.E. (Mid-Essex). "Safety in the Utilisation of Electricity," S. J. Emerson. White Hart Hotel, Tindal St, Chelmsford. 7.45 p.m.

TUESDAY, 17 OCT.

I.E.E. (Education Circle). Discussion: "The Place of Digital Computers in the Teaching of Electrical Engineers." Savoy Pl, W.C.2. 6 p.m.

I.E.E. (E. Midlands). "Safety in the Utilisation of Electricity," S. J. Emerson. Nottingham University. 6.30 p.m

I.E.E. (N. Midlands Utilisation Group). Chairman's address, F. Clarke. Leeds and County Conservative Club, South Parade, Leeds 1. 6.30 p.m.

I.E.E. (N.W. Measurement and Control Group). Chairman's address: "Some Protection and Automatic Features of the British Grid," E. C. Smith. Engineers' Club, Albert Sq, Manchester. 6.15 p.m.

A.S.E.E. (Bradford and District). "Colour Television," G. N. Patchett. Bradford Institute of Technology. 7.30 p.m.

A.S.E.E. Presidential address: "Impressions of Electrical and Educational Developments in Uganda, Kenya and Rhodesia," Sir Willis Jackson. Institution of Electrical Engineers, Savoy Pl, W.C.2. 6.15 p.m.

A.S.E.E. (Oxford and Districts). "Earth Loop Testing and Earth Resistance Measuring," J. Gomersall. Board Room, Employment Exchange, St. Aldates. 7.30 p.m.

A.S.E.E. (W. Kent). "Stage Lighting Equipment," F. E. Brown. Royal Star Hotel, Maidstone. 7.30 p.m.

FOURTEENTH ENGINEERING DISPLAY at Royal Horticultural Society's New Hall, S.W.1, until 19 Oct.

SOCIETY OF INSTRUMENT TECHNOLOGY (Bristol). "Instrumentation and Control at the Hinkley Point Nuclear Power Station," R. B. Quarmby. Dept. of Physics, University of Bristol, The Royal Fort. 7.30 p.m.

I.E.S. (N. Lancashire Gp). Presidential address, W. T. Souter. Demonstration Theatre, NWEB, 19 Friargate, Preston. 6.30 p.m.

WEDNESDAY, 18 OCT.

I.E.E. (Supply). Chairman's address: "Research and Transmission," J. S. Forrest. Savoy Pl, W.C.2. 5.30 p.m.

I.E.E. (E. Midlands). "The Kariba Dam Project—Electrical Installations," C. J. Dickinson. Angel Hotel, Peterborough. 7.30 p.m.

I.E.E. (N.W. Electronics and Communications Group). Chairman's address: "Developments in Broadcasting," W. R. Fletcher. Engineers' Club, Albert Sq, Manchester. 6.15 p.m.

I.E.E. (Southern). "Communication over a Power Network with Special Reference to Power Line Carrier," D. P. Howson and I. R. Smith. Technical College, Brighton. 6.30 p.m.

I.E.E. (Southern Electronics and Control Group). "Bandwidth Compression of Speech," K. Holywell. C.E.G.B. Offices, High St, Portsmouth. 6 p.m.

I.E.E. (S.W. Scotland). "Water Turbine-driven Induction Generators," C. L. C. Allan. Institution of Engineers and Shipbuilders, 39 Elmbank Cres, Glasgow C.2. 6 p.m.

INTERNATIONAL MOTOR EXHIBITION at Earls Court until 28 Oct.

INSTITUTION OF PLANT ENGINEERS (Kent). "The Economics of Back Pressure Generation." S.E. Gas Board Lecture Hall, 95 High St, Rochester. 7 p.m.

SOCIETY OF INSTRUMENT TECHNOLOGY (Newcastle). "Design of Instruments and Control Panels," A. A. Ardley. Conference Room, Roadway Hse, Oxford St. 7 p.m.

A.S.E.E. (Portsmouth and District). "Industrial Application of Photo-electric Cells," E. G. Sills. R.A.F.A. Club, Cosham. 7.30 p.m.

A.S.E.E. (Wolverhampton and District). "General Application of Refrigeration in Industry," P. Nevitt. Chamber of Commerce, District Bank Chmbrs, Lichfield St. 7.45 p.m.

BRITISH INSTITUTION OF RADIO ENGINEERS (Radar Group). "Some Recent Developments in Marine Navigational Aids," J. W. Nichols and A. C. MacKellar. London School of Hygiene and Tropical Medicine, Keppel St, W.C.1. 6 p.m.

THURSDAY, 19 OCT.

I.E.E. (N. Midlands). "Transport and Electric Traction," G. Streets. Joint meeting with the Graduate and Student Section at the Lecture Theatre, Y.E.B. Offices, Ferensway, Hull. 6.30 p.m.

I.E.E. (Western). "Radiocommunication in the Power Industry," E. H. Cox and R. E. Martin. N. Glos Technical College, Cheltenham. 6 p.m.

CHELMSFORD ENGINEERING SOCIETY. "Developments in Stator-fed Variable Speed a.c. Commutator Motors," J. C. H. Bone. Social Hall, Hoffmanns Mfg. 7.30 p.m.

SOCIETY OF INSTRUMENT TECHNOLOGY. The Thomson Lecture: "The Inspiration of Science," Sir George Thomson. Royal Institution, Albemarle St, W.1. 6 p.m.

SOCIETY OF INSTRUMENT TECHNOLOGY (Grangemouth). "Computers," J. Keay. Leapark Hotel, Bo'ness Rd. 7 p.m.

INSTITUTION OF PLANT ENGINEERS. "The Maintenance Problems in a Nuclear Power Station," J. R. Treharne. Castle Hotel, Blackburn. 7.30 p.m.

A.S.E.E. (Newcastle upon Tyne). "Office Lighting," R. A. Hall. Roadway Hse, Oxford St. 7.30 p.m.

FRIDAY, 20 OCT.

I.H.V.E. (Manchester). "Air Conditioning of Operating Theatres," R. Blowers. Engineers' Club, Albert Sq. 6.30 p.m.

BIRMINGHAM ELECTRIC CLUB. Annual dinner. Grosvenor Room, Grand Hotel. 6.30 p.m.

JUNIOR INSTITUTION OF ENGINEERS. "Recent Trends in Telecommunications," R. A. Hill. Pepys Hse, Rochester Row, S.W.1. 7 p.m.

I.E.E. (N.E. Graduates and Students). "An Introduction to Electro-physiology," D. H. Lane. Grey Hall, King's College, Newcastle. 6.30 p.m.

MONDAY, 23 OCT.

I.E.E. Discussion: "Is Automation Making Satisfactory Progress?" Savoy Pl, W.C.2. 5.30 p.m.

I.E.E. (E. Anglian). "British Nuclear Power Today," A. L. Shaw. Assembly Hse, Norwich. 7.30 p.m.

I.E.E. (Mersey and N. Wales). "Technical and Economic Aspects of the Supply of Reactive Power in England and Wales," W. Casson and H. J. Sheppard. Town Hall, Chester. 6.30 p.m.

I.E.E. (N.E.). "Silicon Power Rectifiers," A. J. Blundell, A. E. Garside, R. G. Hibberd and I. Williams. Neville Hall, Westgate Rd, Newcastle upon Tyne. 6.15 p.m.

I.E.E. (N. Staffs). "The Development of Communication, Indication and Telemetering Equipment for the British Grid," G. A. Burns, F. Fletcher, C. H. Chambers and P. F. Gunning. N. Staffs College of Technology, Stoke-on-Trent. 7 p.m.

I.E.E. (N.W.). Discussion: "How Long Do We Go On Teaching Our Subject Historically?" Education Discussion Circle meeting at the Royal College of Advanced Technology, Salford. 6.15 p.m.

I.E.E. (S. Midlands Electronics and Measurement Group). "Space-charge-limited Dielectric Devices—Successors to the Transistor?" G. T. Wright. James Watt Memorial Institute, Birmingham. 6 p.m.

I.E.E. (Western Utilisation Group). Section Chairman's address: "Research in the Field of Electricity Utilisation," H. G. Taylor. S.W.E.B. Demonstration Theatre, Bristol. 6 p.m.

I.E.S. (Bath and Bristol Centre). "The New I.E.S. Code," H. Hewitt. Gardiner, Sons and Co. Ltd., Bristol.

I.E.S. (Birmingham Centre). "Floodlighting in Colour," J. W. Bessant. Chamber of Commerce 75 Harborne Rd, Edgbaston, Birmingham 15. 6.30 p.m.

I.E.S. (Leeds Centre). "Office Lighting," R. G. Hopkinson. British Lighting Council, 24 Aire St, Leeds 1. 6.15 p.m.

I.E.S. (Leicester Centre). "The New I.E.S. Code," W. E. Harper. Demonstration Theatre, E. Midlands EB, Charles St, Leicester. 6.15 p.m.

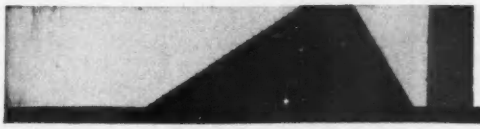
TUESDAY, 24 OCT.

I.E.E. (Measurement and Control). "The Use of Analogue Computers in Predicting the Space-time Behaviour of Nuclear Reactors," R. W. Hockney and T. O. Jeffries. Savoy Pl, W.C.2. 5.30 p.m.

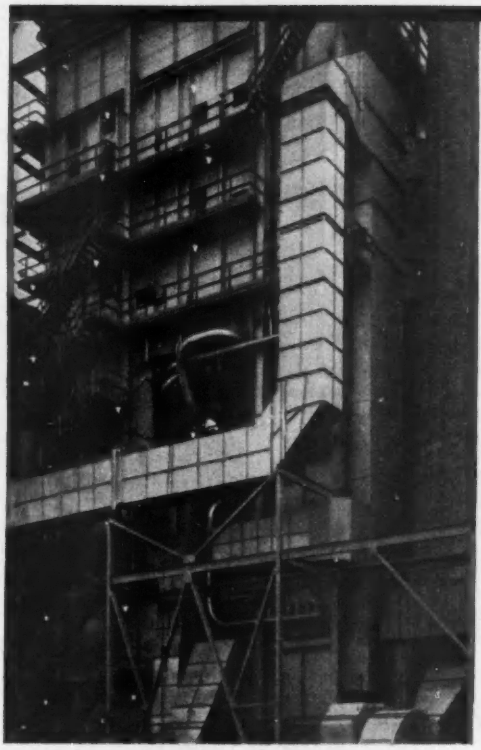
I.E.E. (N.W. Supply Group). "A General Method of Digital Network Analysis Particularly Suitable for Use with Low-speed Computers," M. N. John. "Digital Computers in Power System Analysis," P. P. Gupta and M. W. Humphrey Davies. Engineers' Club, Manchester. 6.15 p.m.

I.E.E. (S.E. Scotland). Sub-Centre Chairman's address, W. E. J. Farvis. Carlton Hotel, North Bridge, Edinburgh. 7 p.m.

I.H.V.E. (Scottish). Discussion: "The Heating of Buildings by Off-Peak Electricity Supplies." Scottish Bldg Centre, 425 Sauchiehall St, Glasgow. 7 p.m.



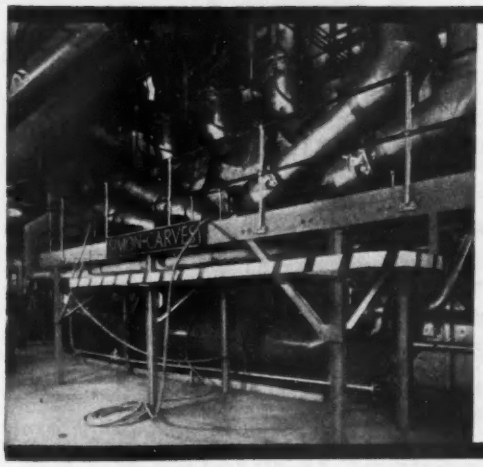
"Remarkable" SAID THE MINISTER



So said Mr. Richard Wood, the Minister of Power, at the inauguration of Britain's first once-through supercritical forced-circulation boiler. Designed and built by Simon-Carves at the Margam works of the Steel Company of Wales, it marks a major advance in large-scale steam generating practice.

The steam conditions of 3300 p.s.i. and 1060°F are the highest yet commercially used in Great Britain. The associated back-pressure turbo-alternator gives an output of 9500 KW (approximately 30% increased on the installed capacity of the existing generation plant). Process steam is exhausted at 650 p.s.i.g. and reheated to 820°F to serve the new turbo-blowers and the existing system.

Whether generating steam at pressures above or below the critical pressure, the O T boiler has many advantages over conventional natural and assisted circulation boilers. These are explained in the brochure 'OT Forced-Circulation Boilers by Simon-Carves Ltd'.



left. The operating front of the boiler is housed in the turbine building. Fuel can be blast furnace gas or fuel oil or a mixture of both.

right. The central control panel. From here, both the boiler and the high pressure turbines are controlled.

O T FORCED-CIRCULATION BOILERS BY

Simon-Carves Ltd

MEMBER COMPANY SIMON ENGINEERING LTD

CHEADLE HEATH, STOCKPORT · *AND AT CALCUTTA · JOHANNESBURG · SYDNEY · TORONTO*

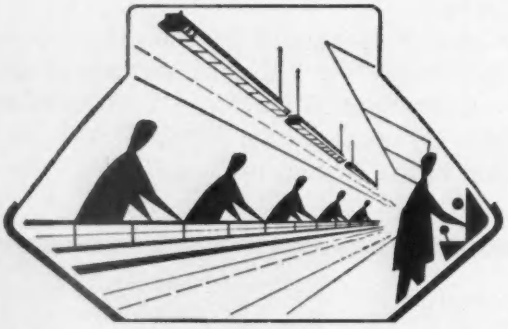
SC 232/PS

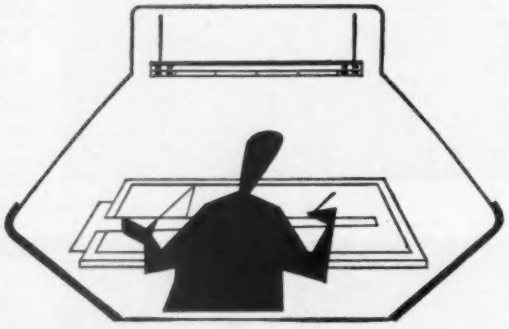
AEI SLIMLINE Radiant Heaters

Today's most adaptable heater

3 RATINGS, 3 LENGTHS, 3 FIXINGS, 3 BEAMS . . . make these efficient, low-cost units today's most versatile heat source. Fine reflectors and many ingenious fittings 'beam' the heat where you want it . . . when you want it . . . for a one-bench installation or half-a-mile of factory floor. No waste here in heating unoccupied areas! Robust construction combines with 'slimline' design . . . first-class workmanship combines with competitive prices. Stock, specify, use or sell these versatile units for yourself.

Non-corrodible extruded aluminium body. Anodised mirror finish parabolic reflector.
Robust long-life Inconel metal sheathed elements.
A unique feature is the ability to angle the heater from flexible suspension.





3 LOADINGS:
1 kW, 2 kW, 3 kW

LENGTHS:
3 ft 3 in, 5 ft 10 in, 8 ft 6 in

3 FIXINGS:
Angle-bracket. Conduit. Chains.

BEAMS:
Standard. Double-width.
Double intensity.

—AND ECONOMICAL TOO! Prices £4.8.0: £6.16.0: £8.4.0: guard extra in each case

For price leaflet and technical literature on planning an installation contact your nearest AEI office or the address below

AEI

Associated Electrical Industries Ltd

HEATING AND WELDING DEPARTMENT TRANSFORMER DIVISION

TRAFFORD PARK, MANCHESTER, 17

L/I 007

CLASSIFIED ADVERTISEMENTS

TENDERS INVITED

MATLOCK URBAN DISTRICT COUNCIL

Street Lighting—Trunk Road A.6 from Masson Mills, Matlock Bath, to the 30 m.p.h. limit, Derby Road, Cromford.

TENDERS are invited for the provision and erection of 28 Group "A" lighting units consisting of steel columns, 140 watts sodium discharge lamps and auxiliary equipment, etc., on the above road.

General conditions of contract and plans may be inspected during office hours and specification, bills of quantities and form of tender obtained from Mr N. Chamberlain, Engineer and Surveyor, Town Hall, Matlock, on payment of a deposit of £2 2s, which will be refunded upon receipt of a bona-fide tender.

Tenders in plain sealed envelope, endorsed "Tender for Street Lighting," must be delivered to the undersigned not later than 12 noon on 3 Nov., 1961.

The Council do not bind themselves to accept the lowest or any tender.

J. OWEN HUNT,
Clerk and Solicitor.

Town Hall,
Matlock.
4 Oct., 1961. (C 313)

BOROUGH OF CHESTERFIELD

Street Lighting A.61

Exeter-Leeds Trunk Road

TENDERS are invited for the following:

1. Supply and delivery of 165 No. tubular steel columns of 25 ft mounting height and 3 No. steel wall brackets and boxes.

2. Supply and delivery of 157 x 140 W sodium Group "A" medium angle beam side-entry lanterns and one post-top x 140 W Group "A" sodium lantern.

3. Supply and delivery of 17 No. 3 x 80 W fluorescent lanterns complete with lamps and gear for side-entry mounting with an alternative quotation for 17 No. 400 W colour-corrected mercury lanterns complete with lamps and gear.

4. Supply and delivery of 158 No. 140 W sodium lamps complete with gear.

5. Erection of 165 No. 25 ft steel columns and three wall brackets and removal of 146 concrete 25 ft columns.

Contractors may tender separately for any item or all items.

Conditions of contract and plan may be inspected at the Borough Engineer's Office, Town Hall, Chesterfield.

The Specification, Bills of Quantities and Forms of Tender will be available at the same office during normal office hours upon payment of a deposit of £2 2s, returnable on receipt of a bona fide tender and return of all documents. Tenders in plain sealed envelopes endorsed "Street Lighting A.61" to be delivered to the undersigned not later than 30 Oct., 1961.

The Council does not bind themselves to accept the lowest or any tender.

RICHARD CLEGG,
Town Clerk.

2 Oct., 1961. (C 281)

YORKSHIRE ELECTRICITY BOARD

Distribution Transformers

TENDERS are invited for the supply and delivery of Distribution Transformers for the year 1962.

Specifications and Tender Forms can be obtained upon application to the undersigned.

Closing date for receipt of tenders will be noon on 8 Nov., 1961.

The Board does not bind itself to accept the lowest or any tender.

E. K. RICHMOND,
Secretary.

Wetherby Rd,
Scarcroft,
Leeds. (C 286)

CITY AND COUNTY OF BRISTOL

TENDERS invited for supply of undermentioned materials during the 12 months, 1 Jan., 1962, to 31 Dec., 1962.

Electric Lamps.

Transformers and Capacitors.

Electrical Sundries.

Electric Cables.

Cement, Mortar, Plasters.

Bricks, Tiles and Salt Glazed Ware.

Forms of Tender, Specifications and Conditions from City Engineer and Planning Officer, Cabot Hse, Deanery Rd, Bristol 1. Tenders to be returned by 28 Oct. Lowest or any tender not necessarily accepted. (C 294)

APPOINTMENTS VACANT

CENTRAL ELECTRICITY GENERATING BOARD

Midlands Project Group

ASSISTANT ENGINEERS (DRAWING OFFICE)

APPLICATIONS are invited for the following appointments in the Midlands Project Group Drawing Office at Bournville, Birmingham:

(A) FOURTH ASSISTANT ENGINEER (MECHANICAL)

Salary scale 10 of the National Joint Board (£1,070/£1,325 per annum).

(B) GENERAL ASSISTANT ENGINEERS MECHANICAL, ELECTRICAL AND CIVIL

Salary within either Scale 8 (£920/£1,165), Scale 7 (£840/£1,090) or Scale 5 (£690/£940 per annum) of the National Joint Board Agreement.

Applicants should have received a sound practical and technical training and possess or be working towards a suitable professional qualification.

Applications should be made on standard form AE6, available from the Administrative Officer, Central Electricity Generating Board, Midlands Project Group, P.O. Box No. 314, Birmingham 30, and should be returned to him not later than 30 Oct., 1961.

Envelopes should be marked "Confidential —Staff Vacancy Notice No. MPG.62/61." (C 298)

CENTRAL ELECTRICITY GENERATING BOARD

Western Division

GENERAL ASSISTANT ENGINEER (CHEMIST)

W/AV/94/61.

REQUIRED at Castle Meads Power Station, Gloucester.

Superannuation Scheme. Salary: N.J.B. Class E, Grade 11, Scale 3, £715/£805 per annum.

Applicants should preferably possess the H.N.C. in Chemistry and should have had experience of the basic chemical services for a steam power station relating mainly to fuel sampling and analysis, water treatment and boiler water control, for a medium pressure plant.

Applications on Form AE6/ACT, obtainable from the Regional Personnel Department, 26 Oakfield Rd, Bristol 8, should be completed and returned by 25 Oct., 1961. (C 303)

THE EAST MIDLANDS ELECTRICITY BOARD

APPLICATIONS are invited from suitably qualified and experienced persons for the following appointment. Applicants should state age, qualifications, experience, etc., and quote the vacancy number.

Derby and Burton Sub-Area

FOURTH ASSISTANT COMMERCIAL ENGINEER

Vacancy No. 120.

Salary: N.J.B. Class K, Grade 12, £965/£1,090 per annum.

The duties will include assisting in the development of supply, utilisation, negotiations with consumers, and the preparation of reports and commercial statistics.

Candidates should preferably hold the Higher National Certificate in Electrical Engineering or an equivalent qualification.

Applications should be forwarded to the Manager, Derby and Burton Sub-Area, Electricity Offices, Irongate, Derby, in a confidential envelope marked "Fourth Assistant Commercial Engineer," by 27 Oct., 1961. (C 307)

CENTRAL ELECTRICITY GENERATING BOARD

South Thames Division

KINGSTON POWER STATION

GENERAL ASSISTANT ENGINEERS (RELIEF)

Vacancy No. 263/61.

THE successful candidates must be prepared to do shift work when required, and experience in power station practice would be an advantage.

Salary: N.J.B. Class G, Grade 14, £710/£790 per annum, plus £90 shift allowance when applicable.

Applications giving age, details of experience, qualifications, etc., should be sent to the Station Superintendent, Kingston Power Station, Downhall Rd, Kingston upon Thames, Surrey, to arrive by 24 Oct.

BRIGHTON "A" POWER STATION

ASSISTANT ENGINEER (ELECTRICAL MAINTENANCE)

Vacancy No. 264/61.

The successful candidate will be required to give general assistance within the electrical maintenance department. A knowledge of power station electrical equipment, including alternators and high voltage switchgear, would be an advantage.

Salary: N.J.B. Class H, Grade 11, £940/£1,065 per annum.

Applications giving age, details of experience, qualifications, etc., should be sent to the Station Superintendent, Brighton "A" and "B" Power Stations, Portslade-by-Sea, Sussex to arrive by 24 Oct. (C 312)

Advertisements should be sent to the Classified Advertisement Dept., Electrical Times, Sardinia House, Sardinia Street, London, W.C.2, before 10 a.m. on TUESDAY of the week of issue. Official Displayed Advertisements are charged at 46s. per inch, and all other classified advertisements at 3s. 6d. per line. Situations Wanted four insertions at twice the single insertion rate. Fee for Box Number and postage on replies 2s.

CENTRAL ELECTRICITY GENERATING BOARD

South Wales Division

APPLICATIONS are invited for the following superannuable N.J.B. Schedule A appointments in the South Wales Division.

MAINTENANCE ENGINEER (ELECTRICAL)

NEWPORT POWER STATION, MON.

Vacancy No. 274/ET/61.

Salary: Class F, Grade 6, Scale 9, £1,115/£1,245 per annum.

Applicants should have had wide experience of power station electrical maintenance and should preferably be Corporate Members of the Institution of Electrical Engineers.

ASSISTANT MAINTENANCE ENGINEER (MECHANICAL)

CARMARTHEN BAY POWER STATION

BURRY PORT, CARMS.

Vacancy No. 275/ET/61.

Salary: Class K, Grade 8, Scale 11, £1,275/£1,410 per annum.

Applicants should possess H.N.C. or equivalent qualifications and have had experience in power station mechanical maintenance.

The successful candidate will be required to assist the Mechanical Maintenance Engineer and the Planning Engineer.

Special application forms obtainable from Divisional Secretary, Central Electricity Generating Board, Twyn-y-fedwen Rd, Gabalfa, Cardiff, to be returned by 28 Oct., 1961. (C 277)

KAMPALA MUNICIPAL COUNCIL

Uganda, East Africa

WORKS SUPERVISOR (ELECTRICAL)

REQUIRED in scale £1,143/£1,671, plus 6% gratuity on completion of contract of 21/27 months; 4 months' paid leave and air passages for officer and family after two years; Provident Fund (adds 7½% to salary); housing at nominal rent; medical and dental benefits; car loan and allowances; good climate and conditions.

Applicants must have served a five-year apprenticeship with a recognised electrical undertaking or company and hold the Ordinary National Certificate (Electrical) or equivalent qualification. Works training and experience in maintenance and repair of S.G.E. and/or A.T.E. vehicular actuated traffic signals essential.

The duties are principally on the installation and maintenance of the vehicular actuated traffic signals; also on the installation, maintenance and repair of the normal electrical systems and plant of a local authority.

Apply, giving age and two referees, to the Town Clerk, P.O. Box 210, Kampala, Uganda, by 21 Oct., 1961. Canvassing disqualifies.

(C 182)

SOUTH OF SCOTLAND ELECTRICITY BOARD

Lanarkshire Area

APPOINTMENT OF SECOND ASSISTANT DISTRICT COMMERCIAL ENGINEER

LANARK DISTRICT

APPLICANTS should have had a sound engineering and technical training and subsequent experience in the development of commercial, industrial and domestic loads and of "Off-peak" supplies with a good knowledge of heating installation, including floor-warming. They will also be required to assist in the general work of the Commercial Department.

The salary and conditions of service will be in accordance with the National Joint Board Agreement, Schedule A, the present classification and grading being E.7. Salary: £965/£1,090 per annum.

Application forms, which can be obtained from the Manager, Montrose Cres, Hamilton, should be returned to this office within 14 days from the date of this advertisement. (C 287)

AYRSHIRE EDUCATION AUTHORITY

INVITE applications for the post of

TEACHER OF ELECTRICAL ENGINEERING

in Ayr Technical College. Applicants should hold an Ordinary Degree in Electrical Engineering or Associate Membership of the Institution of Electrical Engineers, or Associateship in Electrical Engineering of a Central Institution, or a Higher National Certificate in Electrical Engineering. Teaching experience and/or practical experience in the electrical contracting industry would be an advantage. Salary on scales £785/£1,420, or £685/£1,290, according to qualifications, with an additional £65 per annum for approved teacher training. Placing on salary scale is determined by industrial experience and/or teaching experience.

Full details of post and form of application are obtainable from the Director of Education, County Bldgs, Ayr, to whom the completed forms should be returned within 14 days from the date of this advertisement. (C 283)

MIDLANDS ELECTRICITY BOARD

GENERAL ASSISTANT DISTRICT COMMERCIAL ENGINEER

REQUIRED in the Stafford District. Duties will include advising consumers in respect of domestic and commercial electrical equipment, estimating and contracting work. A good knowledge of electrical installation practice is required together with good commercial ability. Technical qualifications desirable.

Salary within the range £715/£805 per annum (N.J.B. Grade F.12), according to qualifications and experience. Superannuable.

Apply, by letter, within ten days, stating age, qualifications, experience, present position and salary, to Mr C. C. Pimble, Area Manager, Midlands Electricity Board, 234 Victoria Rd, Fenton, Stoke-on-Trent.

F. W. CATER,
Secretary.
(C 295)

THE UNIVERSITY OF MANCHESTER

ELECTRICAL ENGINEER

APPLICATIONS are invited for the position of Electrical Engineer in the Buildings Section of the Bursar's Department. The person appointed will be responsible for the maintenance of electrical services throughout the University and for minor alterations and additions to electrical installations.

Applicants should be Chartered Electrical Engineers or have other approved professional qualifications. Salary in the range £1,600/£1,850 per annum, according to qualifications and experience. In addition, a child allowance (£50 per annum for each child in receipt of full-time education) is payable. The post carries membership of the Federated Superannuation System for Universities.

Further particulars may be obtained from the Bursar, The University, Manchester 13, to whom applications should be sent as soon as possible. (C 278)

THE SOUTH WALES ELECTRICITY BOARD

Monmouthshire & Mid-Wales Area

JOINTERS (E.H.T.)

REQUIRED in the Newport (Mon) District. Present rate of pay 5s 6¼d per hour for a 42-hour five-day week. Conditions of Service in accordance with the N.J.I.C. Agreement for the Electricity Supply Industry. Candidates should have served a recognised apprenticeship or a period of training.

Applications giving details of age, present position, training and experience, should be addressed to W. E. Richardson, M.I.E.E., Manager, Monmouthshire and Mid-Wales Area, Llywelyn Rd, Cwmbran, Mon, to arrive not later than 28 Oct., 1961.

R. G. WILLIAMS,
Secretary.
(C 293)

CENTRAL ELECTRICITY GENERATING BOARD

West Midlands Division

APPLICATIONS are invited for the following positions in the Divisional Testing Department with Headquarters at Hams Hall Power Station. The superannuable appointments are covered by N.J.B. service conditions.

(a) THIRD ASSISTANT ENGINEER

Scale 13, salary within the range £1,260/£1,610 (Vacancy No. 264/61 MD.)

(b) FOURTH ASSISTANT ENGINEER

Scale 9, salary within the range £920/£1,245. (Vacancy No. 265/61 MD.)

The engineer appointed to post (a) will be concerned with the performance of electrostatic and mechanical dust catching plant in the Division's Power Stations and must be capable of advising on operation. Applicants, who should be suitably qualified, must have experience in this field.

Post (b), which is primarily concerned with the efficiency of all mechanical and some electrical plant in power stations, should appeal to any man with a clear analytical mind. Applicants should possess suitable engineering qualifications and experience in efficiency testing will be advantageous.

Applications to be made, quoting appropriate vacancy number, to Mr W. A. Clement, Divisional Testing Engineer, Nechells Power Station, off Aston Church Rd, Nechells, Birmingham 7, by 23 Oct., 1961. (C 297)

CENTRAL ELECTRICITY GENERATING BOARD

SENIOR LANDS OFFICER

REQUIRED in the Wayleave Branch at Headquarters, London W.1.

The appointment will be in the Consents Section of the Wayleave Branch, which is responsible for progressing applications for statutory consents required for grid lines, and for correspondence with Government Departments, national bodies, objectors, prospective wayleave grantors, etc.

The successful applicant will be responsible to the Head of the Section for part of this work. Familiarity with the relevant legislation and experience of work and correspondence in this field or of general legal work will therefore be of considerable advantage to candidates.

Salary within the scale £2,025/£2,230 per annum.

Applications stating age, qualifications, experience, present position and salary to the Appointments Officer, 24-30 Holborn, London, E.C.1, by 30 Oct. Quote "Ref.: ET/464." (C 288)

CENTRAL ELECTRICITY GENERATING BOARD

South Eastern Region

North Thames Division

APPLICATIONS are invited for the following appointment at West Thurrock Generating Station (Essex):

ASSISTANT ENGINEER (ELECTRICAL MAINTENANCE)

Salary: N.J.B., Class M, Grade 10, Scale 11, £1,275/£1,410, plus London Weighting £50 per annum.

Applicants should have served an apprenticeship and obtained the H.N.C. in Electrical Engineering, and have had experience in the operation and maintenance of the high voltage electrical plant in a large modern generating station.

Applications, quoting Reference S.V. No. 1550, stating age, qualifications, experience and present position, should be sent to the Personnel Officer, Central Electricity Generating Board, South Eastern Region, North Thames Division, West Farm Pl, Chalk La, Cockfosters, Barnet, Herts, to arrive not later than 21 Oct., 1961.

F. W. SKELCHER,
Assistant Regional Director.
(C 276)

SOUTH OF SCOTLAND ELECTRICITY BOARD

Ayrshire Area

SECOND ASSISTANT DISTRICT

COMMERCIAL ENGINEERS

ENGINEERS with extensive experience of the use of electricity for space and water heating, and who hold at least the H.N.C. in Electrical Engineering, are required for appointment as Second Assistant District Commercial Engineers in the Ayr/Mauchline, Kilmarnock and Ardrossan Districts of this Area. Salaries in Ayr/Mauchline G-7 £1,115/£1,245 and in Kilmarnock and Ardrossan F-7 £1,040/£1,165 per annum.

GENERAL ASSISTANT DISTRICT ENGINEER

(AYR)

An Engineer, with experience of distribution networks up to 33 kV and holding the O.N.C. in Electrical Engineering, is required for the above post. Salary: F-11 £765/£870. A house can be made available to the successful applicant.

Applications for these superannuable posts on the standard form stating post applied for and District preferred should be sent to G. F. Moore, Manager, Ayrshire Area, Greenholm St, Kilmarnock, by 27 Oct., 1961. (C 284)

YORKSHIRE ELECTRICITY BOARD

No. 6 (Hull) Sub-Area

BEVERLEY SUB-DISTRICT

LOCAL MANAGER AND ENGINEER

APPLICATIONS are invited for the above vacancy from engineers who have had a wide experience of the operation and maintenance of extensive rural and urban E.H.V. and L.V. networks.

The substantive post is that of Second Assistant District Engineer with salary within the range £1,350/£1,500 per annum, in accordance with N.J.B. Class K, Grade 7. The successful candidate will be responsible also for the supervision of administrative and commercial staff of the Beverley Sub-District, for which an additional responsibility allowance of £90 per annum will be paid.

Housing accommodation will be available if required.

Applications, together with the names of two referees, should be sent to the Manager, No. 6 (Hull) Sub-Area, Yorkshire Electricity Board, Ferensway, Hull, not later than 27 Oct., 1961.

Head Office

CHIEF ENGINEER'S DEPARTMENT

THIRD ASSISTANT ENGINEER

DISTRIBUTION DESIGN (MAINS)

Applicants should have had experience in the design and installation of underground cable systems up to and including 33 kV. Some knowledge of oil-filled and gas pressure installations up to 66 kV, of cable manufacture and of overhead line construction will be an advantage.

Salary is within the range £1,145/£1,410 per annum (N.J.B. K.8, transitional to Scale 11), the commencing salary being dependent upon qualifications and experience.

Applications, together with the names of two referees, should be sent to the Secretary, Yorkshire Electricity Board, Wetherby Rd, Scarcroft Leeds, not later than 27 Oct., 1961.

No. 7 (Grimsby) Sub-Area

GRIMSBY DISTRICT

THIRD ASSISTANT DISTRICT ENGINEER

Applicants should have experience in the design, construction, operation and maintenance of h.v. and l.v. overhead and underground distribution systems, substation plant and ancillary equipment.

Salary: N.J.B. Class H, Grade 9 (Scale 8), £1,040/£1,165 per annum.

GAINSBOROUGH DISTRICT

THIRD ASSISTANT DISTRICT ENGINEER

Applicants should have experience in the design, construction, operation and maintenance of h.v. and l.v. overhead and underground distribution systems, substation plant and ancillary equipment.

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Salary: N.J.B. Class E, Grade 9 (Scale 5), £825/£940 per annum.

Applications, together with the names of two referees, should be sent to the Manager, No. 7 (Grimsby) Sub-Area, Yorkshire Electricity Board, Moss Rd, Grimsby, not later than 27 Oct., 1961.

No. 5 (Wakefield) Sub-Area

CASTLEFORD DISTRICT

SECOND ASSISTANT DISTRICT ENGINEER

Applicants should have had a sound practical training and experience in the construction, operation and maintenance of h.v. and m.v. overhead and underground distribution networks, substation plant and ancillary equipment.

Candidates should have attained a satisfactory technical standard, and had responsibility for district engineering work. Candidates must be prepared to reside in the District and undertake standby duties.

Salary: N.J.B. Class H, Grade 7 (Scale 10), £1,190/£1,325 per annum.

Sub-Area Headquarters

SENIOR ASSISTANT

(ESTATES AND WAYLEAVES)

Applications are invited for the above appointment. The successful applicant will be required to give assistance to the officer in charge of the Estates and Wayleaves Section dealing with the negotiations in connection with the acquisition of land by purchase or lease for use as substation sites. Previous experience in estate work will be an advantage.

Salary: N.J.C. Grade 4, £890 x £30—£1,010 per annum.

Applications, together with the names of two referees, should be sent to the Manager, No. 5 (Wakefield) Sub-Area, Yorkshire Electricity Board, 1a Denby Dale Rd, Wakefield, not later than 27 Oct., 1961. (C 314)

Eastern Electricity

CHIEF COMMERCIAL OFFICER

213/61.B.

APPLICATIONS are invited for this appointment at Board's Headquarters, Wherstead, Ipswich, in succession to Mr R. H. M. Barkham who has been appointed to become Deputy Chairman of the Yorkshire Electricity Board. Candidates should have a wide knowledge and experience of commercial practice, particularly in the Electricity Supply Industry, and preferably be Corporate Members of the Institution of Electrical Engineers. The successful candidate will be responsible to the Board for the direction of all aspects of commercial development, including the formulation of tariffs, load promotion and sales and contracting activities.

The salary for the post will be superannuable and within the range of £3,750/£4,500, and the appointment is to date from 1 Jan., 1962. Applications by letter should be submitted to the Secretary, Eastern Electricity Board, P.O. Box 40, Wherstead, Ipswich, by 27 Oct., 1961.

Northmet Sub-Area

(a) THIRD ASSISTANT ENGINEER

ST. ALBANS DISTRICT (Ref. 1052)

209/61.R.

(b) FOURTH ASSISTANT ENGINEER

STEVENAGE DISTRICT (Ref. 1087)

210/61.R.

Candidates should have had a sound technical training and suitable experience in the construction, operation and maintenance of H.V. and L.V. distribution systems including substations.

Salary: (a) N.J.B. Class H, Grade 9 (£1,040/£1,165).

(b) N.J.B. Class G, Grade 11 (£825/£940).

Apply by letter, by 23 Oct., 1961, as follows:

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(a) To F. J. Drake, ASSOCIATE I.E.E., Manager, Eastern Electricity Board, 107 St. Peter's St, St. Albans, Herts.

(b) To H. L. Sumner, Manager, Eastern Electricity Board, Walkern Rd, Stevenage, Herts.

Suffolk Sub-Area

FOURTH ASSISTANT ENGINEER

NORTH EAST SUFFOLK DISTRICT

212/61.N.

Candidates should have had a sound technical training and suitable experience in the construction, operation and maintenance of H.V. and L.V. distribution systems.

Salary: N.J.B. Class F, Grade 11 (£765/£870).

Apply by letter to J. H. Shepherd, A.M.C.T., A.M.I.E.E., Manager, North East Suffolk District, Eastern Electricity Board, The Grove, Ingate, Beccles, Suffolk, by 27 Oct., 1961. (C 308)

CENTRAL ELECTRICITY GENERATING BOARD

Midlands Region

East Midlands Division

GENERAL ASSISTANT ENGINEER

(CHEMIST)

SPONDON POWER STATION

Vacancy No. 222/61.

APPLICATIONS are invited for the position of General Assistant Engineer (Chemist) at Spondon Power Station, near Derby.

Candidates must have had a sound technical training and previous laboratory experience and should preferably hold the Higher National Certificate in Chemistry, but consideration will be given to candidates studying for that qualification.

Salary will be in accordance with Class J, Grade 14 (£765/£870 per annum), of the National Joint Board Agreement.

Closing date for receipt of applications: 20 Oct., 1961.

GENERAL ASSISTANT ENGINEER

WILLINGTON "A" AND "B" POWER STATIONS

Vacancy No. 223/61.

Applications are invited for the position of General Assistant Engineer in the Efficiency and Planning Department at Willington "A" and "B" Power Stations, P.O. Box No. 27, Derby. Candidates should have the minimum qualification of an Ordinary National Certificate in Mechanical or Electrical Engineering and should have an understanding of the problems involved in modern power station operation.

The salary will be within Class M, Grade 16 (£825/£940 per annum), of the National Joint Board Agreement.

Closing date for receipt of applications: 20 Oct., 1961.

ASSISTANT ENGINEER (OPERATION)

CASTLE DONINGTON POWER STATION

Vacancy No. 225/61.

Applications are invited for the position of Assistant Engineer (Operation) at Castle Donington Power Station, Castle Donington, near Derby.

Candidates should have had operating experience on large modern pulverised fuel fired boilers and associated turbines.

Salary will be in accordance with Class L, Grade 10 (£1,190/£1,325 per annum), of the National Joint Board Agreement, plus 10% allowance for shift duties.

Closing date for receipt of applications: 27 Oct., 1961.

These appointments are pensionable within the terms and conditions of the Electricity Supply (Staff) Superannuation Scheme.

Applications should be submitted on the official form AE6/ACT, which may be obtained from the Station Superintendent concerned and should be returned to him by the date stated.

O. S. WOODS,
Assistant Regional Director.
(C 310)

THE NORTH WESTERN ELECTRICITY BOARD

SENIOR DEMONSTRATOR

SUB-AREA COMMERCIAL DEPARTMENT

MANCHESTER

APPLICANTS should be experienced in demonstrating all types of domestic electrical equipment and commercial catering equipment to public audiences in Service Centres and on consumers' premises. They should hold the E.A.W. Certificate in Electrical Housecraft.

Salary Scale: £700/£775 p.a., Grade 2. N.J.C. Conditions.

Applications on forms to be obtained from the Manager (Staff Vacancy), No. 1 Sub-Area, The North Western Electricity Board, Town Hall, Manchester 2, P.O. Box 493, and returned to him by 23 Oct., 1961. (C 299)

MERSEYSIDE AND NORTH WALES ELECTRICITY BOARD

FOURTH ASSISTANT ENGINEER

(TECHNICAL)

REQUIRED at No. 3 Sub-Area Headquarters, Chester. Salary: £890/£1,015 per annum (N.J.B. K.13).

Applicants should have received an engineering training, and possess suitable technical qualifications. Duties will include testing and commissioning electrical plant and ancillary equipment at voltages up to 33 kV.

Appointment subject to medical examination. Pension Scheme.

Applications, on forms obtainable from the Manager, No. 3 Sub-Area, Electricity Hse, Newgate St, Chester, must be forwarded not later than 27 Oct., 1961.

Previous applicants need not re-apply. (C 306)

WANDSWORTH TECHNICAL COLLEGE

Wandsworth High Street, S.W.18

REQUIRES owing to expansion of work:

1. LECTURER

to teach Electronics with Transistors up to Post H.N.C. standard and to extend existing Transistor courses.

Salary scale (at present under review): £1,408 x £35—£1,601.

2. ASSISTANT LECTURER, GRADE B

to teach subjects of the City and Guilds Installation B and C courses (Course 51).

Salary scale (at present under review): £738 x £27 10s—£1,201.

For these posts graduate or equivalent qualifications required; industrial and teaching experience desirable. Increments within salary scale for appropriate experience; additions to Assistant Lecturer's scale for qualifications and training.

Application form from Secretary returnable by 27 Oct. Please quote (FE.3a/T/2697/10). (C 315)

MERSEYSIDE AND NORTH WALES ELECTRICITY BOARD

SENIOR ASSISTANT

REQUIRED in the Establishments Section of the Secretary's Department at Board Headquarters, Electricity Hse, Love La, Liverpool 3.

Salary within range £1,150/£1,240 per annum (N.J.C. Grade 6).

Applicants should have had good experience in personnel administration, preferably in the Electricity Supply Industry, sound knowledge of the application of agreements relating to salaries, wages and conditions of service generally, and the ability to assist in the formulation of the varied organisational patterns and statistical returns associated with the Board's personnel.

Appointment subject to medical examination. Pension Scheme.

Applications should be forwarded to the Establishments Officer at the above address. Closing date: 25 Oct., 1961. (C 305)

CENTRAL ELECTRICITY GENERATING BOARD

South Thames Division

TECHNICAL DEPARTMENT

NORTHFLEET DISTRICT

ENGINEER

Vacancy No. 147E/61.

REQUIRED to join a District team commissioning major electrical plant in generating and transforming substations in West Kent and maintaining automatic protective and control gear on such plant in that area. Previous experience in similar work is essential. Candidates must possess Higher National Certificate in Electrical Engineering or equivalent qualifications. Ability to make calculations of unbalanced fault conditions and to write a good report is desirable. The successful candidate will be required to live within approximately ten miles of the District Headquarters at Northfleet.

The post is designated Third Assistant Engineer (Technical).

Salary: N.J.B. Class K, Grade 8, £1,195/£1,460 per annum, including London Allowance. The conditions of service are as decided by the National Joint Board, with generous holidays and sick pay scheme and a contributory superannuation scheme.

Applications giving age, details of experience, qualifications, etc., should be sent to the Personnel Officer, Central Electricity Hse, Lower Ham Rd, Kingston upon Thames, Surrey, to arrive by 20 Oct. (C 311)

SOUTH EASTERN ELECTRICITY BOARD

KENT MANAGER

CONSEQUENT upon the forthcoming retirement of Mr H. F. Knell, M.B.E., J.P., M.I.E.E., in June, 1962, applications are invited for the appointment of Manager of the Kent sub-area with headquarters at Rochester.

Salary in accordance with N.J.M. Scale, Grade 10, Class D, £3,515/£3,765.

Candidates should be corporate members of the I.E.E., and must have had a wide experience of all aspects of electricity supply and distribution, together with management responsibility.

The Kent sub-area has a number of large industrial consumers and covers an area of 1,010 square miles, comprising densely populated urban districts and an extensive rural area. In 1960-61 a maximum demand of 404 MW was recorded and unit sales totalled 1,817 million.

Applications, quoting ET and naming two referees, to The Secretary, South Eastern Electricity Board Headquarters, 10 Queen's Gdns, Hove 3, Sussex, by 1 Nov., 1961.

FIRST ASSISTANT DISTRICT

COMMERCIAL ENGINEER

CROYDON AND PURLEY DISTRICT

Salary: £1,500/£1,670 p.a., including London Allowance under N.J.B. Class J, Grade 5, with progression to Grade 4 (maximum salary £1,780), subject to satisfactory service. Superannuable. The successful applicant will be responsible to the District Commercial Engineer for supply and tariff negotiations, sales activities, contracting and general development. Candidates should be suitably qualified and widely experienced in the commercial side of the industry. They should also be capable of promoting a progressive commercial development policy.

Applications, quoting ET and naming two referees, on forms from District Manager, Seeboard, Electric Hse, Wellesley Rd, Croydon, by 25 Oct., 1961.

ASSISTANT DISTRICT ENGINEER

SEVENOAKS AND REIGATE DISTRICT

Salary: £1,115/£1,245 per annum under N.J.B. Class G, Grade 7. Superannuable. Applicants, of good general education, with technical training to H.N.C. standard, should have had practical experience of the planning, construction and maintenance of M.V. and 11 kV underground and overhead systems of supply. The successful

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candidate will operate from district office, Oxted, but duties will cover any point within the district.

Applications, quoting ET and naming two referees, to District Manager, Seeboard, Electric Hse, West Hill, Oxted, Surrey, by 25 Oct., 1961.

ASSISTANT DISTRICT COMMERCIAL

ENGINEER

GUILDFORD

Salary: £890 x £25—£1,015 per annum under N.J.B. Class F, Grade 9. Superannuable. Applicants should have had experience in commercial, industrial and domestic development. A good knowledge of heating installations including floor-warming is necessary.

Applications, quoting ET, on forms from District Manager, Seeboard, Woodbridge Rd, Guildford, Surrey, by 25 Oct., 1961.

SHOWROOM ASSISTANT

CROYDON AND PURLEY DISTRICT

Annual salary including London Allowance £285 at 16, to £490 at 20, rising to £600, £680 or £740, according to qualifications obtained and ability. Duties will include general showroom work and the advising of consumers on the use of electrical apparatus. The successful applicant may be required to work in any showroom of the Croydon and Purley district. He may also be required to carry out cashier duties.

Applications, quoting ET and naming two referees, on forms from District Manager, Seeboard, Electric Hse, Wellesley Rd, Croydon, by 25 Oct., 1961.

GEORGE WRAY,
Secretary.
(C 309)

CENTRAL ELECTRICITY GENERATING BOARD

West Midlands Division

STATION CHEMIST

REQUIRED for Burton Power Station. N.J.B. service conditions, superannuable appointment, salary within Grade E7, £965/£1,090 per annum.

Applicants should preferably have experience in a power station laboratory and possess the H.N.C. in chemistry. They should be familiar with sampling and analysis of coal, water and oil, and with the application of the results. Duties will include assisting the Station Chemist in the provision of satisfactory chemical services to the Station.

Apply, quoting Vacancy Number 263/61 MD on form AE6, available from the Station Superintendent, Burton Power Station, Wetmore Rd, Burton-on-Trent, Staffs. Closing date for receipt of applications is 23 Oct., 1961. (C 296)

NATIONAL SAUDI ELECTRIC COMPANY

RIYADH, SAUDI ARABIA

Power Station Superintendent required for the management of a Gas Turbine Power Plant of 24 MW capicity and a Diesel Power Plant of 5 MW capacity.

Applicants must be fully qualified and experienced and preferably corporate members of a recognised institution.

Appointment in the first instance will be for two years, with one month home leave at the end of each 11 months.

Applications to be sent in writing to:

Ref.: RFS,
Kennedy & Donkin,
12 Caxton St,
Westminster, S.W.1,

not later than 26 Oct., 1961.
(C 285)

EXPERIENCED TRACER DRAUGHTSWOMAN (ELECTRICAL)

required by

UNILEVER LIMITED

for their Head Office to make tracings of drawings prepared by technicians and to make simple drawings and diagrams of connections and later to make tracings of the same. Superannuation Scheme and Sickness Benefit Scheme. Five-day week. Salary according to experience. Please apply, in writing, to

Head Office Staff Department,
UNILEVER LTD.,
Unilever Hse,
Blackfriars, London E.C.4.

(C 317)

FREDERICK S. SNOW & PARTNERS

CONSULTING ENGINEERS

Invite applications for Electrical Engineers to work on a wide range of Industrial and Commercial Projects in their Electrical and Mechanical Department.

Applicants should preferably have practical experience in Electrical Installation Design in Buildings, and hold National Certificate or equivalent qualifications.

The organisation has a superannuation scheme and luncheon voucher facilities.

Details of education, training, age and experience should be sent in confidence to:

Ross House,
144 Southwark Street,
London S.E.1.

(C 289)

RTB

RICHARD THOMAS & BALDWINS LTD.

SPENCER WORKS

We require an

ELECTRICAL ENGINEER

to take charge of electrical maintenance in the blast furnace and sinter plants at Spencer Works, the integrated iron and steel works now under construction at Llanwern, nr. Newport, Mon.

The plants comprise extensive conveyor systems, a highly automated sinter plant and two blast furnaces with fully automatic charging.

Applicants should either be corporate members of the I.E.E. or have held a post from which they have gained exceptional experience in this field.

This is a senior position for which the preferred age range is 30-50 years.

Application forms, which should be returned by 23 Oct., can be obtained from:

The Manager,
Staff and Labour Relations Dept.,
RICHARD THOMAS & BALDWINS LTD.
Spencer Works,
Llanwern, nr. Newport, Mon.

Please quote Ref. No. 202/4A in your letter of application.

(C 320)

SOUTH WALES SWITCHGEAR LIMITED

TECHNICAL SALES ENGINEERS

S.W.S. have vacancies for outside sales engineers to operate in the North West Area.

One is required to deal with electricity board work and another to call on industrial concerns.

Preference will be given to applicants who possess at least the H.N.C. in Electrical Engineering, and have served a recognised apprenticeship course. Some experience in switchgear manufacture is essential.

Applications giving full particulars of training, technical qualifications, age and salary expected should be addressed to:

The Home Sales Manager,
South Wales Switchgear Ltd.,
Rex Bldgs, Wilmslow, Cheshire,

and mark the envelope "Confidential."

(C 262)

CENTRAL ELECTRICITY GENERATING BOARD

SOUTHERN PROJECT GROUP

DRAWING OFFICE STAFF

Applications are invited for appointments of Assistant Engineers (Mechanical and Electrical) in the Drawing Office at Group Headquarters, Finchley, N.3.

Candidates should have had a practical engineering training and experience in a drawing office on the mechanical or electrical plant associated with the layout and construction of modern power stations.

Appointments will be made within the following scales of the National Joint Board Agreement, according to qualifications and experience:

	£	£	
Scale 12 ..	1,280 to 1,550		
Scale 10 ..	1,120 to 1,375		including
Scale 8 ..	970 to 1,215		London
Scale 7 ..	890 to 1,140		Allowance
Scale 5 ..	740 to 990		
Scale 4 ..	725 to 920		

Applications stating age, qualifications, experience, present position and salary should be forwarded to the Administrative Officer, Central Electricity Generating Board, Southern Project Group, Squires La, Finchley, London N.3, to arrive not later than 27 Oct., 1961.

Envelopes should be marked "Confidential—Ref.: S/61/26."

T. YULE,
Chief Project Engineer.

(C 318)

KUWAIT OIL COMPANY LTD.

require an

ASSISTANT ELECTRICAL ENGINEER

for service in

KUWAIT

Applicants should be in the age range 25-35 and be in possession of the Higher National Certificate in Electrical Engineering or equivalent qualification and should have had extensive experience of power system operation and of the maintenance of switchgear, transformers (with automatic on-load tap changing equipment), underground and overhead distribution up to 66 kV, modern protective equipment and automatic control gear. Experience in the problems associated with interconnecting transmission between power stations is also desirable.

Whole local salary will be dependent on qualifications and experience but will not be less than £2,430 per annum. Kit allowance of £85 is payable. There is no tax on personal income in Kuwait.

Write for application form giving brief details and quoting K.2821 to Box D/65, c/o Hanway Hse, Clark's Pl, E.C.2.

(C 280)

INSPECTING ENGINEER

Required by Consulting Engineers to be based on their Manchester (Didsbury) Office, but candidates must be willing to spend periods of service elsewhere in the U.K. and abroad. Applicants should have had a sound electrical engineering training with subsequent experience mainly in the switchgear field. They must also possess at least Graduate Membership of the I.E.E. Salary and prospects would be commensurate with the character of the appointment. Application forms are obtainable from Staff Appointments, Kennedy and Donkin, 813A Wilmslow Rd, Manchester 20. (C 324)

UNILEVER LIMITED

require

Technical Assistants (Electrical)

at their Head Office for the design and layout of complete electrification schemes including generation and/or public supply. Successful applicants would be required to design, specify and initiate the ordering of electrical equipment and contract installations, control design draughtsmen and contractors, cover technical correspondence and consultative work, witness manufacturers' works tests and site tests, commission projects on completion and pass same for payment.

Applicants should be between 25 and 30 years old and must hold the H.N. Certificate in Electrical Engineering (preference given to A.M.I.E.E. or Grad. I.E.E.). Superannuation scheme. Salary according to age and experience.

Applications should be addressed to:

Head Office Staff Department (WF/87),
UNILEVER LTD.,
Unilever Hse, Blackfriars, London E.C.4.

(C 292)

SOUTH OF SCOTLAND ELECTRICITY BOARD

APPLICATIONS are invited for the superannuable position of

SENIOR ASSISTANT ENGINEER
(POWER PLANT DESIGN)

in the Technical Section of the Chief Engineer's Department.

Applicants should have had wide experience in switchgear design, inspection and testing, appropriate to transmission, generation and distribution system.

Preference will be given to candidates who hold a University Degree in Engineering and are Corporate Members of the Institution of Electrical Engineers.

Salary: N.J.B., Class K, Grade 1 (£1,880/£2,235), 2 (£1,750/£2,085) or 3 (£1,625/£1,950) according to qualifications and experience.

Applications, quoting reference No. E29/61, should be submitted on the standard form to the Secretary, South of Scotland Electricity Board, Inverlair Ave, Glasgow S.4, not later than Friday, 27 Oct., 1961. (C 290)

THE NORTH EASTERN ELECTRICITY BOARD

APPLICATIONS are invited from suitably qualified engineers for the following appointments which are subject to the conditions of the National Joint Board.

Tees Sub-Area

SECOND ASSISTANT DISTRICT ENGINEER
DARLINGTON

SECOND ASSISTANT DISTRICT ENGINEER
MIDDLESBROUGH

Salaries: Schedule A, Class G, Grade 7, £1,115/£1,245 per annum.

Applicants should have experience in the construction, operation and maintenance of h.v. and l.v. overhead and underground distribution systems in urban and rural areas, substation plant and ancillary equipment.

Applications stating age, qualifications and experience to be received by Assistant Secretary (Establishments), The North Eastern Electricity Board, G.P.O. Box No. 117, Carliol Hse, Newcastle upon Tyne 1, within ten days of the appearance of this advertisement. (C 300)

MERSEYSIDE AND NORTH WALES ELECTRICITY BOARD

THIRD ASSISTANT COMMERCIAL ENGINEER

REQUIRED at No. 1 Sub-Area Headquarters, Liverpool. Salary within range £1,275/£1,410 per annum (N.J.B. M.10).

Applicants should have experience in the commercial and domestic application of electricity, and be capable of advising on and estimating for electrical installation work in all classes of commercial premises. They should also be capable of preparing lighting, heating and water heating schemes. Applicants should have suitable technical qualifications.

Appointment subject to medical examination. Pension Scheme.

Special application forms, obtainable from the Manager, No. 1 Sub-Area, 24 Hatton Garden, Liverpool 3, should be returned not later than 27 Oct., 1961.

Previous applicants need not re-apply. (C 304)

MIDDLESEX COUNTY COUNCIL-COUNTY ARCHITECT'S DEPT.

ELECTRICAL ENGINEERING ASSISTANT

REQUIRED, APT. III (£1,005/£1,185, inclusive). Established and superannuable post. Prescribed conditions. Should have practical exper. or knowledge of contractor's office, preparation of drawings and specifications for wiring of buildings. Application forms (s.a.e.) from County Architect, 1 Queen Anne's Gate Bldgs, Dartmouth St, S.W.1, returnable by 23 Oct. (Quote H.579 ET.) (C 323)

MERSEYSIDE AND NORTH WALES ELECTRICITY BOARD

ASSISTANT CONSUMERS' ENGINEER

REQUIRED in the Northwich District of the Board's No. 2 Sub-Area. Salary within range £625/£700 per annum (N.J.B. F.14).

This is an active and interesting post, and offers good future prospects for a suitable applicant. Staff conditions of service, including Holiday, Sick Pay and Pension Schemes.

Duties will include estimating for contracting work and advising consumers on matters relating to electricity supply and the utilisation of electrical equipment. An appropriate technical qualification is desirable.

Appointment subject to medical examination.

Application forms obtainable from the Manager, No. 2 Sub-Area, Sandiway Hse, Northwich, Cheshire. Closing date: 27 Oct., 1961.

Previous applicants need not re-apply. (C 302)

SOUTH OF SCOTLAND ELECTRICITY BOARD

Fife Area

FIRST ASSISTANT DISTRICT COMMERCIAL ENGINEER

REQUIRED for Western District based on Dunfermline. Salary: N.J.B. G4 (Scale 12), £1,350/£1,500 per annum.

SECOND ASSISTANT ENGINEER
(PLANNING AND DEVELOPMENT)

Required at Area Headquarters, Dunfermline. Salary: N.J.B. J7 (Scale 11), £1,275/£1,410 per annum.

Applicants should have had a sound practical and technical training to Higher National Certificate standard; positions superannuable, subject to satisfactory evidence of health.

Applications, on standard form, obtainable from the Area Manager, South of Scotland Electricity Board, East Port, Dunfermline, should be returned not later than Saturday, 21 Oct., 1961. (C 291)

THE SOUTH WALES ELECTRICITY BOARD

ASSISTANT ENGINEER

APPLICATIONS are invited for the position of Assistant Engineer in the Newport District of the Monmouthshire and Mid Wales Area.

Preference will be given to Engineers possessing the Higher National Certificate in Electrical Engineering.

Salary: N.J.B. Class H, Grade 9, Scale 8, £1,040/£1,165 per annum.

Applications stating age, present position, present salary, qualifications and experience should be addressed to W. E. Richardson, M.I.E.E., Manager, Monmouthshire and Mid Wales Area, Llywelyn Rd, Cwmbran, Mon., to arrive not later than 28 Oct., 1961.

Please quote Reference 125/61/ET, endorsing envelope "Assistant Engineer."

R. G. WILLIAMS,
Secretary. (C 301)

MANCHESTER CORPORATION TRANSPORT DEPARTMENT

REQUIRE

ASSISTANT ENGINEER (ELECTRICAL)

QUALIFICATIONS: final examination of the Institution of Electrical Engineers or the H.N.C. To be responsible for preparation of electrical specifications, supervision of alterations to and maintenance of electrical installations on department's premises and maintenance of V.H.F. radio.

Salary: £960/£1,310 per annum.

Application forms and further details of duties and conditions from the General Manager, Dept. E.T., Piccadilly, Manchester 1, returnable by Monday, 30 Oct., 1961. (C 325)

BRITISH ENGINE BOILER AND ELECTRICAL INSURANCE CO. LTD., Longridge Hse, Manchester 4. ELECTRICAL SURVEYORS required. Permanent positions carrying progressive salary scale £825/£1,225 with non-contributory pension. Candidates aged 26 to 32, with H.N.C. in Electrical Engineering or Grad. I.E.E. and with apprenticeship in manufacture or repair of electrical machinery, are invited to apply stating age, qualifications and experience. (C 316)

ELECTRICAL ENGINEER, Higher National Certificate or equal and possessing initiative, drive and enthusiasm, is required for London Design Office. Knowledge of variable speed drives, automatic control and switchgear would be considered desirable.

The position offers excellent opportunity to gain wide experience in application of electrical equipment to steelworks plant and equipment.

Applications should be addressed in first instance to: Mr I. W. Drewelus, The Wellman Smith Owen Engineering Corporation Ltd., Parnell Hse, Wilton Rd, London S.W.1. (C 279)

POLYPHASE TEST. Experienced TESTERS or IMPROVERS. These vacancies afford unique opportunity for experience on calibration of a wide range of integrating electricity meters and ancillary equipment. Staff status after qualifying period. Please inquire: Personnel Manager, Landis and Gyr Ltd., Victoria Rd, North Acton, W.3. Acorn 5311. (C 246)

SALES LIGHTING ENGINEER required for Central and South London area, previous experience essential, car provided, contributory pension scheme. Applications will be treated in confidence and should be made to the Sales Director, F. W. Thorpe Ltd., Welby Rd, Hall Green, Birmingham 28. (C 282)

SENIOR TRANSFORMER DESIGNER with experience of various types up to 5 MVA. This appointment carries a very realistic salary and scope for the future for the right man between 30-40. A company house is available if required. Factory is situated in ideal rural surroundings four miles from the sea. Apply Chief Designer, London Transformer Products Ltd., Bridgend, Glam. (C 13)

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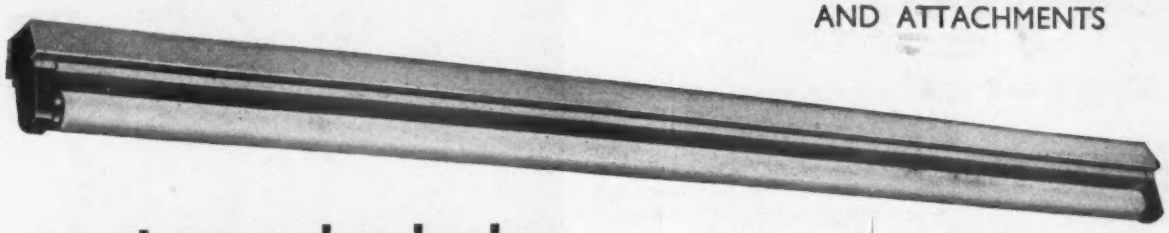

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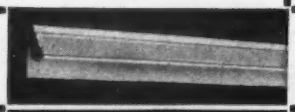
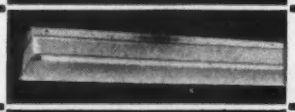
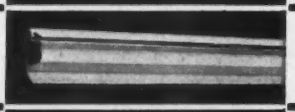
ATLAS HDZ Open-end metal trough reflector with slots to allow upward lighting.		HDZ.18 **£2. 5. 0** No P. Tax	HDZ.15 **£1. 3. 0** No P. Tax	HDZ.14 **£1. 1. 6** No P. Tax	—
ATLAS HDY A translucent closed-end trough in opal perspex for upward lighting.		—	HDY.15 **£3. 0. 0** No P. Tax	HDY.14 **£2. 17. 0** No P. Tax	—
ATLAS HDX Angle metal trough reflector especially suitable for 'directional' lighting.		HDX.18 **£1. 16. 0** No P. Tax	HDX.15 **£0. 18. 0** No P. Tax	HDX.14 **£0. 17. 0** No P. Tax	HDX.12 **£0. 15. 0** No P. Tax
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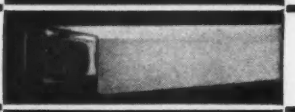
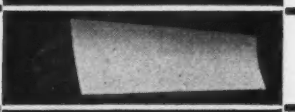
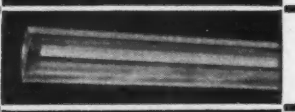
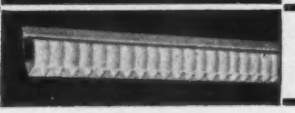
ATLAS HDN A versatile attachment in opal plastic suitable as a diffuser for store display.		—	—	HDN.14 **£1. 12. 4** inc. 5/4d. P. Tax	HDN.12 **£1. 2. 10** inc. 3/10d. P. Tax
ATLAS HDA Acelon diffuser with wooden end panels ideal for wall mounted applications.		—	—	HDA. 14 **£3. 14. 6** inc. 12/6d. P. Tax	HDA. 12 **£3. 3. 4** inc. 10/8d. P. Tax
ATLAS HDL Aluminium parabolic anodised reflector providing a narrow beam of light.		—	HDL. 15 **£4. 10. 0** No P. Tax	—	—
ATLAS 'CLIPLUVE' Moulded in translucent opal plastic and supplied in sections for instant attachment direct to tubes.		KU5.P Pack of FIVE sections **£1. 16. 1** inc. 6/1d. P. Tax.			

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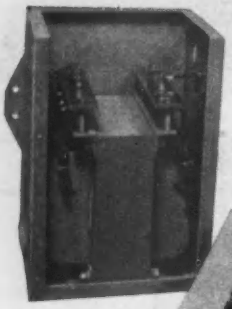

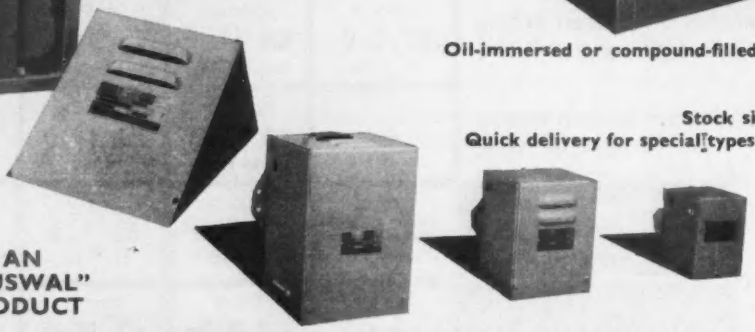

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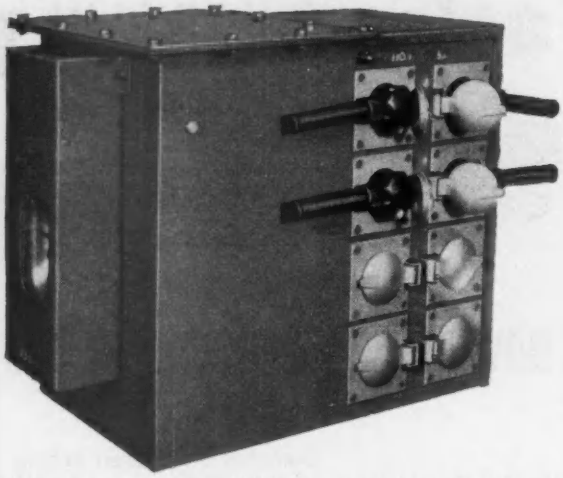

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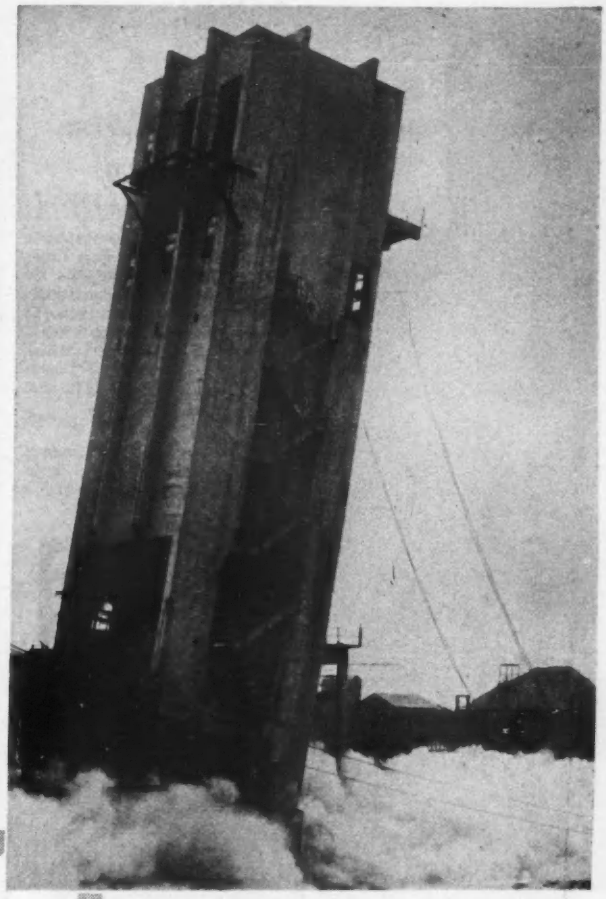

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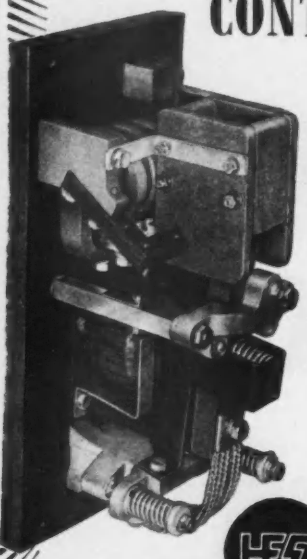

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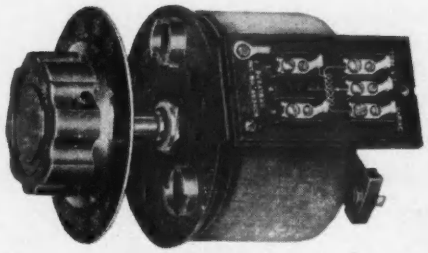

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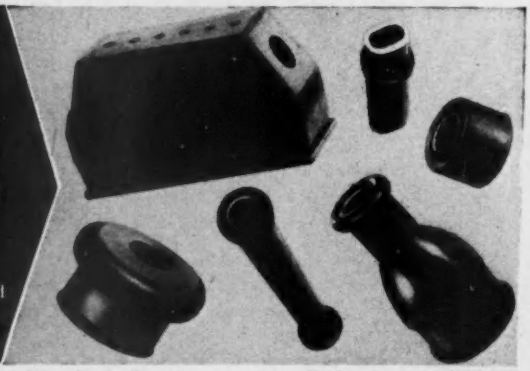

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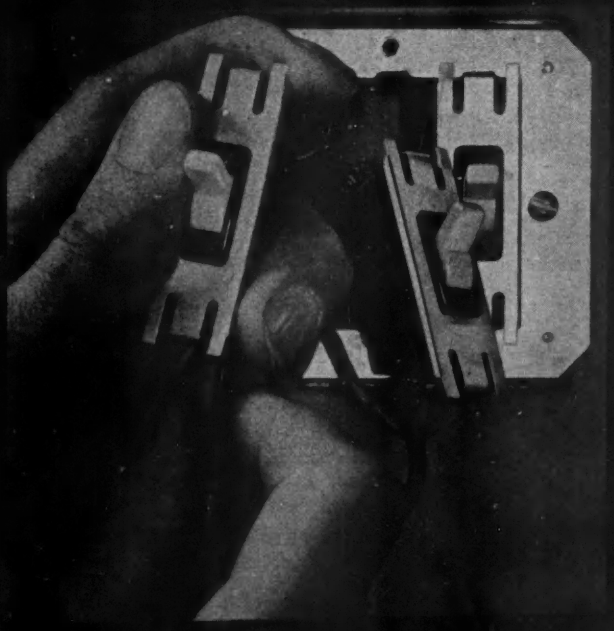

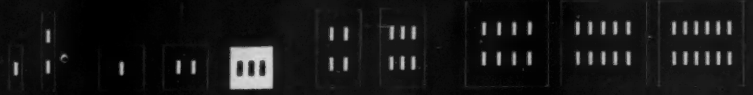

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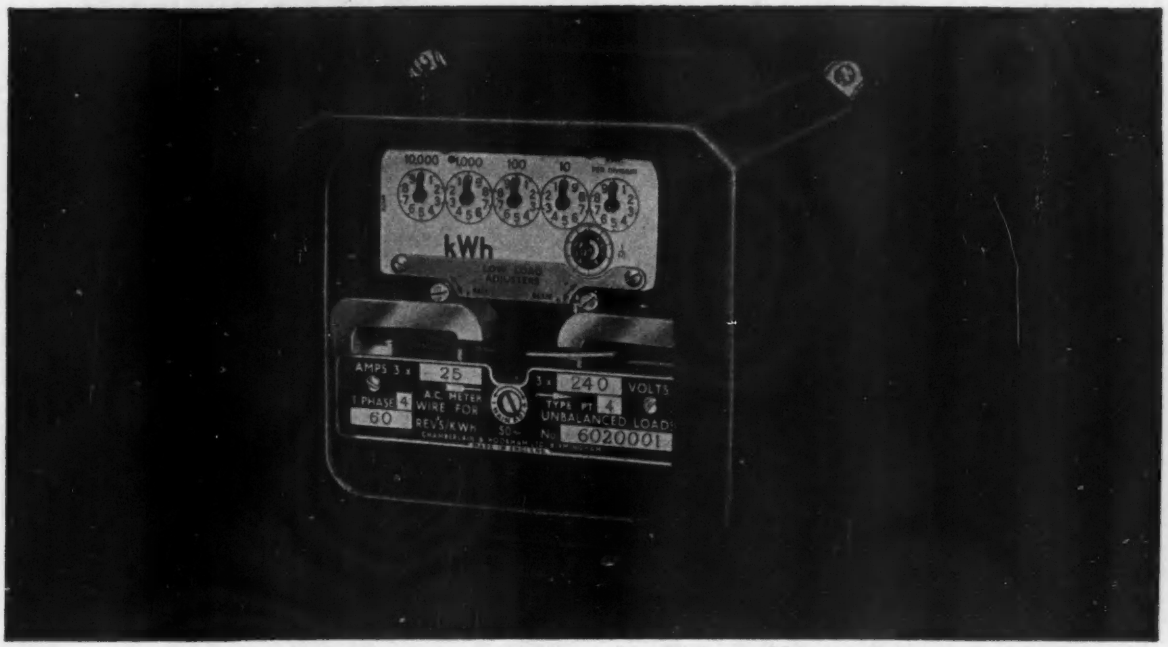

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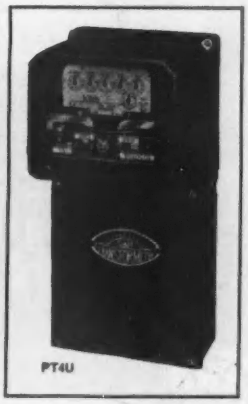
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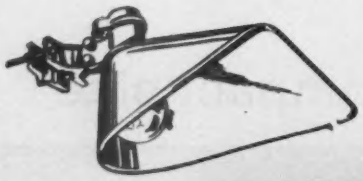

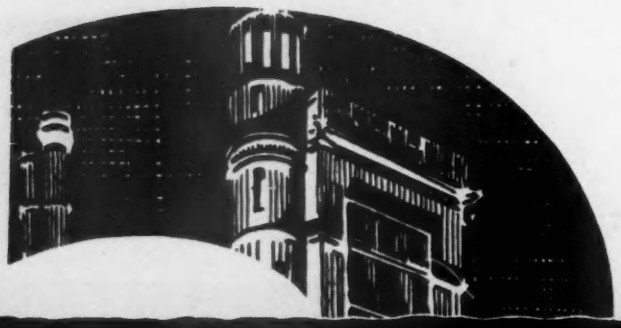

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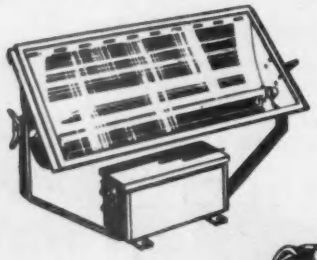

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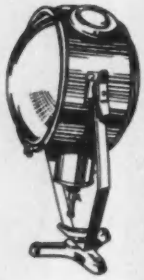

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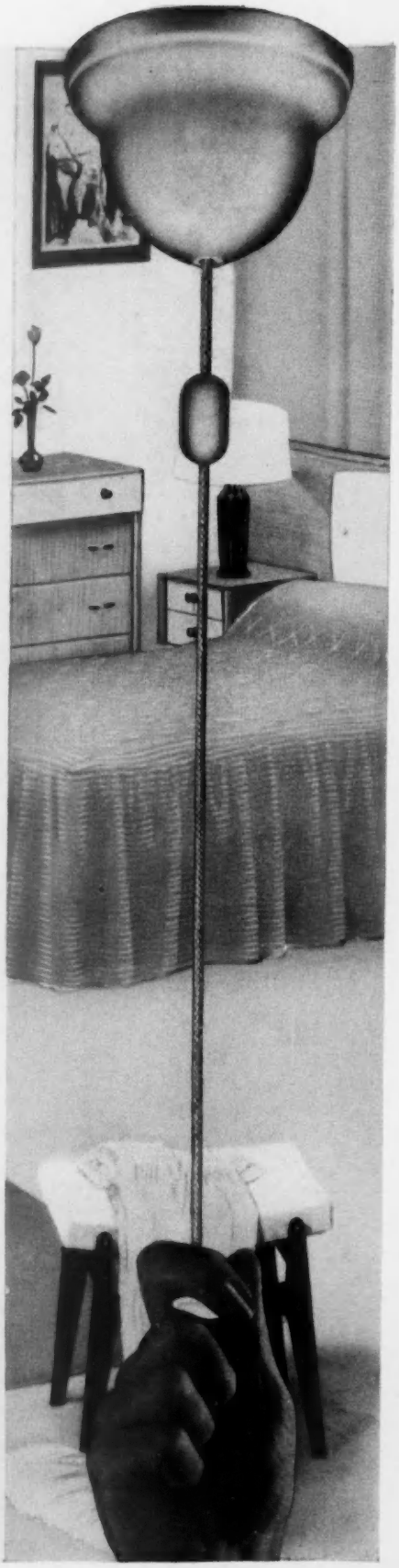
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